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**Gokhale Institute of Politics and Economics  
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**The Population Problem in India;  
A Regional Approach**

BY  
**N. V. SOVANI, M.A.**

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**1942**

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## FOREWORD

For a long time I have felt that the study of the population problem of India considered as a single unit failed to yield significant conclusions and was indeed apt to mislead. Some years ago I made a tentative attempt to analyse part of the available data on the basis of smaller and more integrated regions but could not proceed far with the work. When, therefore, Mr. Sovani expressed a desire to work on some aspect of the Indian population problem I suggested to him the possibility of this regional approach. He readily took up the suggestion and the result was a thesis which in a somewhat abridged and revised form is here presented to the public.

The chief task performed by Mr. Sovani has been to gather together all the important available and relevant data on economic conditions and on the composition and movement of population and to present them separately and in a connected form for a number of homogeneous and / or integrated regions. The chief aim of the study has been a search for any well-defined trends in population movement or any significant correlations between physical environment, economic circumstance and population composition or growth that may exist in a particular region or a group of regions. The major justification for the study is the assumption that India is too vast and too heterogeneous in respect of all factors which should count in a study of the problem of population—geographic, economic, social and cultural and that the Indian population problem is not a single problem but a collection of a number of different types of problems. On this assumption the averages yielded by an all-India study cease to have much meaning ; they would contain within themselves such a diversity of phenomena that they would conceal much more than they could reveal. For a study, therefore, both of the particular Indian situation and of the conclusions relating to the general theory of population that it yields the splitting up of the problem into a number of properly constituted units is rendered vitally necessary.

The formation of these units is, however, not a matter entirely of free choice ; it is largely predetermined by the manner in which

the data have been compiled in the past. The constituent units for the conduct of the Indian Imperial Census are the Indian provinces and the major Indian States. It has always been realised by those in charge of the provincial and State Censuses that most of the provinces and some of the States were mixed in character. Therefore, in compiling and presenting the provincial or State data the Census Commissioners usually prepared tables on the basis of smaller units, called by them "natural" units. These natural units were formed chiefly in view of the geographic factors, so that the climate, the rainfall and the main agricultural conditions in a natural unit were fairly uniform. The natural units being comparatively small and compact areas they were usually homogeneous also in respect of other important factors such as language and social structure. The natural units, once determined, were followed from Census to Census and data in respect of these units were presented in the successive Census reports. It is difficult for a student of these data to depart from the limits of natural units as defined in the Census reports. Because any one desiring to define independently the limits of a region would find it impossible to compile the data especially for the earlier Censuses for units other than those for which the data have already been presented. The range in the size of the units studied by Mr. Sovani varies in area from 1,480 sq. miles to 66,624 sq. miles and in population from 1,205,016 to 20,690,518. The large majority of the units, however, fall within the population limits of 3,200,000 and 11,500,000 and the area limits of 8,000 sq. miles and 30,000 sq. miles. It will be thus observed that the units studied are comparatively large and are comparable for the most part with countries like Egypt, Norway, Sweden, Spain, Portugal and Ireland.

Before saying anything regarding the conclusions suggested by the data put together by Mr. Sovani it is necessary to emphasize the series of handicaps under which the student of Indian population problems labours. For all his conclusions he has to rely on a single source of information—The Indian Census. The other and the really important series of statistics available in other countries—the birth, the death, the marriage registrations—are either not at all available to him, or are available in such a form that they can be put to no use. These series present the data in a continuous form from year to year and they are usually the basis of all the trustworthy conclusions regarding trends and tendencies. Their absence in India leaves the student with only a discontinuous set of figures revealing the population position at each ten-year interval.

Including the results of both the 1881 and the 1941 Censuses, the maximum of such points of information are seven and the decennial intervals over which changes in population numbers can be studied, six. In view of the modern development in population theory it is unnecessary to emphasize how insufficient are such data of gross population movement for drawing any significant conclusions. This insufficiency appears the more glaring when it is observed that for the major part and for most of the regions studied the decennial figures cannot be taken to register the progress of continuous trends. The period before 1920 was subject, in India, to a number of major calamities and catastrophes which left a deep impress on most of the Census figures. The famine of 1874-76, the famines during the closing years of the last century, the plague epidemics which ravaged large portions of the country intermittently for about two decades after 1896 and the influenza epidemic of 1918, none of these can be treated as normal phenomena, unless, with some writers, one counts the periodic incidence of a catastrophe as a part of the Indian normality. Further, the incidence of the mortality due to the famines, the plague or the influenza was not uniform over the whole population; it varied considerably as between the various age groups and the two sexes. Thus, not only have the total numbers been affected by these events but also the composition of the population according to age and sex bears at each Census the peculiar impress left upon it by these happenings of the previous decades. This latter feature of the Census figures makes it specially difficult to interpret them. In the absence of continuous series of vital statistics, it has been usual with demographers to judge of tendencies towards an increase or a decrease of population from the age composition of a population as revealed at the Census. The earlier Sundburg test or the more recent Bergdorfer test all rely on the use of these data. The use of these tests or methods, however, implies that the composition of the population as revealed at the Census is normal, in the sense of its not being affected by any extraordinary event which could not be reckoned as a persisting integral part of the population situation. None of the data available to us from 1881 to 1941 can be regarded as normal in this sense. The results of the applications of these tests to the Indian statistics have, therefore, to be treated with considerable reservation. It is only proper to add that one of the regions studied by Mr. Sovani—Travancore—was not affected to any marked degree by the various catastrophes enumerated above. The composition of the

population of that region at various Censuses might, therefore, be considered normal.

Some remarks may, at this stage, be made about the relation between opportunities for migration and the rate of growth of the population in a region. It is, of course, obvious that the concept of the comparatively homogeneous region is in itself abstract and its use is permitted because it is a convenient device for bringing out more clearly than would otherwise be possible the operation of the forces affecting the movement of populations. The definition of such a region will, it has been pointed out above, always encounter some difficulties and no region can be said to be unaffected by circumstances and movements in other regions. The chief manner in which a region is affected by others is by migration into it and emigration from it. In this connection the terms "pull" and "push" have been used to differentiate between forces attracting population outside a region and those impelling it to move out of it. It seems to me, however, that the distinction sought to be made and especially the debate as to whether one or the other set of forces more powerfully affect a particular movement are to a large extent unreal. Essentially both a push and a pull are merely the two aspects of the same phenomenon, which is the difference in the relative conditions obtaining in two regions bringing about a movement of population from one to the other in spite of the costs of transfer. No movement can take place unless there exists a better place to go to (pull) and the phrase better conditions outside logically involves comparatively unfavourable conditions (push) at home. It may, perhaps, be better to say that it is always a "pull" that acts; for, there are no conditions so absolutely unfavourable as will "push" people outside a region if they have nowhere else to go to. (It may be noted, that this is written with reference only to movements whose origin is in the main economic and does not apply to such movements as those of the Jews through the greater part of their history. An exception has also to be allowed in the case of movements due to local famines or to permanent changes in the climate of a region such as are supposed to have given rise to movements of population from Central Asia). Also it is well to remember that different population groups will react in a varying manner to the same set of phenomena. The Assam plantations get their labour chiefly from distant Chota Nagpur; the Bengal peasant is attracted neither by these nor by jute mills but only moves in order to occupy the lands in the Assam Valleys. The coal mines do not prove attractive enough to the Chota Nagpur aborigines and have to recruit a large proportion

of their labourers from the districts of U. P. and Bihar. These same districts send labour in large numbers to Calcutta, Bombay and other parts of India but not to any large extent to the tea plantations. One has again to distinguish between migrations from the different strata of the population. Numerically the most important migrations are always those of the labourers and the peasants but the small trader and artisan migration may also assume quite considerable proportion and may be economically important. To the Gujarat peasant the conditions outside are nowhere attractive enough but the small trader from that region has moved out in large numbers to Africa and to other regions of India itself.

To what extent then does migration result in modifying the character of population growth as essentially a problem of regional balance? So far as India is concerned, it does so only to a limited extent. Moreover, the population balance in a region is affected chiefly by conditions in contiguous regions and migration does not, therefore, result in moving the problem from a regional to an all-India basis. As to external migration the directions in which it can take place and its volume are both limited. Fifty years ago Mr. Justice Ranade could contemplate a continuous flow of labour to distant countries. Today the position has so far changed as to create the problem of the repatriation of old migrants. Whatever the distant future may hold in store, at least immediately there is no prospect of any large outlet being thus available to any region in India. Internally there are only a few regions whose development may be said to have been substantially modified by the possibilities of migration.

The character of a population movement in a region during any period is influenced to a considerable extent by the point of historical development reached by the region at the beginning of the period studied. Thus in a land occupied and exploited since ancient times the forces to which population growth was subject and the resultant movement would be very different from the forces and movement in a new colony with large tracts of virgin soil. No region of India in 1881 could be compared to a new colony. The differences in the character of past development were, however, very considerable from region to region and it is a further handicap to the student that little can be said with certainty regarding the movement of Indian population for the century or even half century preceding 1881. The major fact of the history of this century was the series of wars waged by the British for the conquest of India and

the subsequent British occupation of the country. The wars and, the occupation affected different regions at different times. The wars influenced the population of a region according to whether they were short or long drawn out and according to whether they led or did not lead to a transitional period of a quasi-anarchistic regime. The British occupation of Bengal, Bihar and of the populous Gangetic plain as a whole took place comparatively quietly. On the other hand, the population in parts of the Deccan and Central India suffered terribly in the process. Subsequent to the British occupation of the country the two forces that mainly affected population growth were in the first stage the settlement, especially in its revenue aspect, of the country by the new rulers and secondly, the impact through the imports of British goods and capital of the industrial revolution. As a general rule the early British settlements were devastating in their effects on economic life. This was true in the 18th century of the settlement with landlords in Bengal and Bihar as well as in the 19th century of the settlement with the cultivators in Madras and Bombay. It is, however, difficult to disentangle the effects of the revenue settlement from those of other economic forces. It is, for example, clear that in Peninsular India the first half of the 19th century was a period full of difficulties in which the recovery from disturbed times, the occupation of new lands and the growth of population all took place slowly; yet the many factors responsible for the slowness of the pace are not clearly discernible. During the same period, however, Bengal and Bihar had largely got over the earlier stage of revenue mismanagement and had begun to pursue an even course in economic development. In the same manner the opening up of the country to British trade and capital took place in the different regions at widely differing times, depending on two factors, the date of the British occupation and the development of the means of transport. Thus tracts like the Punjab and Sind were occupied much later than other parts of India by the British and regions of the interior in Peninsular and Central India were not opened to commerce to any considerable extent even when so occupied. Bengal took precedence in all matters because of early occupation and the facility of river communications. In spite of these differences the statement might be hazarded that a general movement towards rapid economic development became established over the larger part of India only about the middle of the 19th century. The beginning of, what may be termed the modern trends in Indian

population, has thus to be placed at least three decades before the date of the earliest reliable Census statistics.

This leads to a consideration of the problem of the nature of a population trend. When, for example, we say that the modern trends began to be operative at about a certain period what degree of homogeneity and continuity of phenomenon is implied in the statement? Broadly there is in the background of all such statements an assumption of a certain balance between population numbers and the economic environment, which means that if completely static economic conditions rule over a long enough period a perfectly stable population appropriate for that environment will ultimately be reached (Cf. Marshall, *Principles*, 8th Edition, p. 577). With a given disturbance in the economic conditions brought about by, say, a technological revolution, a process of re-adjustment of numbers to the environment begins and this follows a given course which we term a tendency or a trend. The approach of the statistician who tries to measure the degree and nature of this trend by the method of curve-fitting involves the acceptance of these assumptions in their most rigid form. The statistician when predicting the future of population movement on the basis of a curve fitted to the data relating to the past seems to make a yet further assumption. This is that the whole series of movements—past and future—during the given period are all contained in and predetermined by the originating impulse. The assumption of a long growth cycle (and the period of the population theorist is necessarily very long) implies its non-disturbance at any intermediate point. It is only if the originating forces continue to act unhampered that the growth cycle will follow through its predestined course. The assumption, for example, that in the larger part of India the modern trends in population movement began about 1850 means that the ensemble of modern conditions began to have its joint effect on the movement of population at about that time. This set of forces that we term modern is, of course, highly complex. Let us, for helping the understanding of the phenomenon, enumerate a few of them. The most important of these would seem to be the new technique of material production, the increased knowledge regarding the control and prevention of disease and the breakdown of the old social structure. All these forces together act on a situation, a relation between environment and population which has historically reached a certain point on the basis of other conditions. They transform the situation, disturb the older relation which might or might not

have been at an equilibrium point and begin a series of new movements, working, of course, ultimately through an effect on birth and death rates. The point for consideration is whether these forces work from their origin in a uniform and continuous manner in such wise that their future can be predicted from a sample of the results of their working in the past available in the shape of decennial or annual statistics. An examination of the recent past scarcely warrants this hypothesis. If only one of the modern forces, the new technique of material production, is taken into consideration the history of its progress shows that the course of development has followed no predictable uniform course. This course has seemed to profit specially the economy of one region at one time while that of another at another time. In some cases the substitute employment thrown up has been considerable, in others negligible. Even retrospectively it does not appear that at any time in the past the course of the future could have been confidently predicted. The same is true of the effects of the spread or control of epidemic disease. And the mere increased accumulation of past data cannot increase the confidence in predicting the course of the future. Secondly each curve has a meaning. It may represent a continuous growth at varying paces at different periods of time or it may represent varying combinations of periodic growths and recessive movements; in any event it represents a predetermined regular movement of a certain type. For the results of curve fitting to be logically satisfying it must be explained, apart from the vagaries of curve-fitting, as to why the movement should follow the particular pattern. That is, the nature of the relation between environment and population which leads the movement to follow a particular course must be understood. Some discussion of this sort has taken place about the nature of growth curves in general, both in relation to the study of population and that of industrial fluctuations. But these considerations are ignored in the majority of attempts at curve-fitting to population data, which seem to take for granted that a passable fit to past data gives a good enough basis for predictions. Mr. Sovani has exemplified the use of the most common type of curve in use for this purpose by trying to fit it to data of various types of regions. The curve-fitting was done when the data up to only 1931 were available and they show a varying degree of divergence between the projected figure for 1941 and the actuals recorded in the Census of that year. Reference may also be made here to an article in the *Sankhya*. (An Estimate of the Population of India for the year 1941, T. Krishnamurthy and R. S. Krishnamurthy,

*Sankhya*, Vol III, Part 3, August 1941) where the results of a series of such attempts are recorded. A study of most of these attempts would show that a true prediction could only be in the nature of an accident.

The lack of birth and death statistics makes it impossible to calculate reliable gross or net reproduction rates and the peculiar nature of the sex and age composition data makes the estimates of such rates by certain established methods difficult to rely upon. The approach by the method of curve fitting lends illusory precision to the treatment which is warranted neither by the degree of homogeneity of the data nor by the logic of facts. Mr. Sovani has, therefore, been reduced to the device of merely classifying the various regions by the total extent of the growth that has taken place in them during the entire period and observing whether this leads to any significant grouping of the regions. Such a procedure is, of course, warranted also on grounds other than mere lack of data. It may yield significant results even for regions where ample statistics of all kinds are available. (Cf. "Growth of American Manufacturing Areas" Glen E. McLaughlin, Bureau of Business Research Monograph, University of Pittsburgh, Pennsylvania, 1938.) The classification yields mixed groups in some respects but it shows, specially at the two extremes, what would appear to be the main necessary conditions for a rapid growth of population or for a stagnant state. The areas, the population in which grew rapidly during the period 1881-1931, reveal many common features in respect of security of water supply, richness of land and possibilities of expansion of cultivation. On the other hand, the stagnant regions, which might belong to either the secure or insecure types, show mostly a high degree of previous development and a very narrow margin left for future expansion and in some cases, even a retrogression in agricultural conditions due to the heavy pressure of population on land. It would thus appear that even if it was not possible, because of the paucity of data, to talk with any certainty regarding the actual real trends in net movements at the present time, the bare facts recorded at the past censuses showed a rough and broad relation to exist between environment and population movement.

Mr. Sovani completed his thesis early in 1941 and if I had been writing this 'foreword' at that time I should in all probability have contented myself with the comments made so far. In the mean-

while, however, the summary results of the 1941 Census have become available and they reinforce many latent doubts regarding the possibility of the ordering of the facts of population history in this apparently reasonable manner. The 1941 Census recorded an enormous increase in population in most regions and some of the most remarkable increases have taken place in regions that have been properly regarded so far as most stagnant. This is notably the case with Indo-Gangetic Plain, Central and the Central India Plateau. Nothing in the past history of the numbers in these regions suggested the possibility of this happening. Also the age compositions of these regions at various censuses show no suggestive peculiarities. To explain this increase merely by the absence of a famine or a pestilence is to beg the question. For, famines and pestilences are considered to be the two most important checks on population. And if a region had been overcrowded and, therefore, stagnant for long, any marked upward movement in its numbers ought to be promptly met by either one or both of these checks. This is apart from the fact that the last decade shows a much greater increase in these regions than decades with somewhat similar conditions in the past. As I have said above, the discrepancies revealed by the 1941 Census are only the most glaring. A careful examination the pre-1941 data also raises many problems. Apart, for example, from a few groups at the two extremes the population movements in most other regions are difficult to interpret; difficult to interpret in the sense of not revealing any consistent or clear relation between economic fact and population movement.

It might reasonably be objected at this stage that such a relation if it subsists cannot be a simple one and it may well be that it would be revealed on a very thorough examination of the detailed facts of the economy and history of each region. Mr. Sovani has after all collected together only the available published statistics relating to the more important aspects of the economy of comparatively large regions. A searching examination into more detailed facts in respect of even smaller sub-divisions may explain the why and wherefore of the movements that appear contradictory. It is possible to view this question from two different points of view. The first would be the point of view of those interested in the problem of the growth or decline of population *per se*. For such students all factors—biological, social, economic, etc.—that bear on this study are relevant, and it would be their aim to try to define the relations of whatever type that seem to subsist between the

phenomenon of population and all these kinds of factors. The economist, however, looks at the problem of population from a much more restricted point of view. The economist is concerned with the manner in which population movements act upon and in their turn are influenced by the constituents of his particular field. His interest in the population problem arises out of such questions as to whether a movement in the standard of living or in the general level of wages leads to any changes in population numbers and *vice versa*. If the economic factor is only one among many factors responsible for population movements and if its extent and mode of operation are not clearly observable, these movements fall largely outside the sphere of the economist. He has then to treat the facts of the growth and decline of human population as externally given without being able to weave them integrally into the pattern of his theories. The connection between economic forces and population movement should be clearest in tracts where the economic environment presses most closely on a people and where human institutions and sentiment least modify the normal biological processes. The majority of the regions studied in this work satisfy both these requirements. In them there are clear indications of a pressure of population on resources. And in India as a whole, the process of social disintegration has largely upset the older checks during the last sixty years while nowhere have their newer forms, such as contraception, made any significant advance. The study of these regions for this period should, therefore, most clearly indicate any readily traceable relation of the type in which the economist is most interested. A large body of economic theory has based itself in the past on the assumption of a direct palpable relation between the growth of population and economic environment. In recent times doubts have been raised in some quarters regarding the existence of such a relation, and it has been recognised that the aggregate supply of labour might not be determined by any fundamental economic law. A study of the regional data offered by Mr. Sovani reinforces this sceptical attitude. The broad economic data relating to the various regions do little to explain the mutual similarities or differences in respect of the movements of population, sex-ratios or age composition between region and region. The movements for many regions take from decade to decade such turns that no cogent explanations can be offered regarding them. They also raise strong doubts about the predictability of future trends. Mr. Sovani has drawn attention to many detailed peculiarities of the regional data in the course of his study and to certain general conclusions regarding

the Indian situation as a whole. To me this mass of material relating to a large number of dissimilar regions appears even more interesting as the possible basis of an examination by the economist of the often implicit assumptions of his theoretical formulations.

Gokhale Institute of Politics  
and Economics,  
Poona 4. 19th May 1942. }

D. R. GADGIL.

### **Author's Preface**

The foregoing work was originally written as a thesis for the Master's Degree of the University of Bombay. Here it appears in a revised and more concise form. It is not an exhaustive treatise on the Indian population problem but only a sample inquiry. It does not ladle out any cut and dried schemes or suggestions of reconstruction, as my aim all along has been analysis rather than prescription. In attempting this task, I have signally failed to uphold the tradition that writers on Indian population problems are rapidly establishing, that of being "sensational". My only endeavour has been a critical study of the problem. This work sets forth another and a more realistic point of view and a different method of analysis. And even in that direction, it is in the nature of an armed reconnaissance. The actual battle to follow I leave to more capable hands.

This study is mainly confined to the period 1881-1931. The 2nd and the 3rd chapters are principally concerned with the compilation and analysis of the available regional data and the last three chapters with their interpretation. I claim no finality of analysis or interpretation. When the complete 1941 Census figures become available these will have to be modified accordingly. But this need not cause any embarrassment. All the elements, necessary in population analysis, are always in such a constant state of flux, that all studies of population problems are necessarily studies in time-changes. Any student of population problems, who knows his subject and more particularly the Indian Census Reports—the reading of which breeds a curious insensibility to all surprises—surely knows that the movement of population, like that of a wayward butterfly, is rarely along a rational bee-line. Finality of analysis and opinions in this field, therefore, is always approached, never arrived at. "Lastly all that is contained therein is in submission unto maturer discernments".

The work was carried out under the able direction and guidance of Prin. D. R. Gadgil. My indebtedness to him is beyond words. To his useful advice and penetrating criticism the book owes most of its merit. Let me hasten to add, however, that he does not necessarily share all the opinions expressed herein.

For them and for all strayings into the field of error, I accept full responsibility.

My indebtedness to various authors has been fully acknowledged in the foot-notes. Special thanks are due to the various Provincial Census Superintendents who kindly supplied me with the provisional figures of the 1941 Census. I must thank Mr. Deodhar, who has helped me considerably with the mathematical portions of this work. I also thank Mr. Deo and Mr. Kale, both of the Servants of India Society's Library, for their help and co-operation. I also express my appreciation for the help which I have received from several of my friends. I am deeply obliged to Mr. D. V. Ambekar, Secretary, Servants of India Society, for going through the proofs and making valuable suggestions. I should also express my thanks to the management of the Arya-Bhushan Press for bearing with me patiently, though at times we sorely tried each other's patience.

I can only record here my profound sense of gratitude for the invaluable help rendered to me by my dearest friend — H. A., as etiquette prevents me from expressing it more concretely by way of a dedication.

I have to thank the authorities of the Gokhale Institute of Politics and Economics for consenting to include this work in their series of publications. Lastly, I have to acknowledge my indebtedness to the University of Bombay for the substantial financial help it has granted towards the cost of the publication of this book.

"Alaka",  
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N. V. SOVANI.

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## ERRATA

Page	line	for	read
57	9	11,511,800	11,880,400
75		the figures for acreage under Oilseeds, Cotton and Tobacco for the year 1935-36 are 226,321 ; 1,071,081 ; and 87,251 respectively.	
98	3	6,478,000	6,469,000
115	17	3,365,232	3,191,219





# The Population Problem in India

## A Regional Approach

### CHAPTER I

#### The Framing of the Problem

All discussions on population must start with Malthus. His name is wrongly remembered today as that of a pioneer of birth control, though he never advocated it! What he tried to define was the relationship between the growth of population and the increase of food supply. His thesis was that, due to the unequal rate of their respective growths there was always a tendency of the population outstripping the means of subsistence, and in that case a balance between them was struck by preventive and positive checks. Malthus was so sure about the efficiency of these checks that he eschewed even the possibility of over-population. Only in his later editions, and that too covertly, did he recognise such a possibility.<sup>1</sup>

With all the reverence to the great Divine, his theory now appears crude and unscientific in the light of later research and investigation.<sup>2</sup> All that Malthus really does is to discuss the relative

1 Theories of Production and Distribution : Dr. Edwin Cannan. 1917, p. 137 (foot-note.)

2 Professor Lancelot Hogben writes:—"The Essay on Population is a fitting foot-note on the Baconian theme that 'radical errors in the first concoction of the mind are not to be cured by the excellence of functions and remedies subsequent.' The Malthusian argument, as we all know, was based on a self-evident principle inherent in the original definitions of human ingenuity and parenthood...Intervening advances in technology and biology did not suggest to Malthus the need for clarifying either the limits of human ingenuity (a matter of thermodynamics) or the limits of human reproductive capacity (a matter of social physiology.)

..... Apparently the disciples of Malthus think that what Malthus described would happen if they did not practise what Malthus presumably scheduled as 'vice'. The evidence marshalled by Carr Saunders leads one to doubt whether a situation described by the arithmetical jingle of the gloomy parson has any basis in the recorded experience of human societies." Prolegomena to Political Arithmetic, Prof. Hogben, 1938, p. 31.

probabilities of human and agricultural increase and the effect of the latter on the former. The part played by increasing numbers in increasing the produce—even in its narrowest sense—he leaves almost undiscussed.<sup>1</sup> Though there is certainly no reason to jeer at "the pseudoscientific Law of Malthus," in the spirit of the apologists of the Victorian Age, it is reasonable to assert that, the Malthusian doctrine does not furnish us with an analytical apparatus by which we can unravel the problems of population that face the modern world.

The discussion of population problems was carried one step further by J. S. Mill who introduced the concept of decreasing returns into the Malthusian parameters. This was somewhat contrary to Malthus's line of thinking. Mill's doctrine, however, was static in character.<sup>2</sup> The celebrated "optimum theory" of Dr. Cannan is, in a sense, a direct descendant in the same line as Mill's diminishing returns approach. The theory can be stated thus: "Under given conditions of the arts of production and the progress of science, there must be an optimum point at which real income per head is likely to be maximum, owing to the free interplay of natural resources on the one hand and the facilities of economic co-operation on the other."<sup>3</sup> This concept, as is obvious is not static but dynamic in character. This doctrine, unlike that of Malthus, provides us with the criterion of an economic optimum for a population policy. Any population policy must try to attain "a constant and a dynamic adjustment of the numbers to the economic and the biological environment." The optimum theory does not furnish a quantitative but a directional guidance.<sup>4</sup> As will be shown later on, the positive value of this theory is easily misconceived.

1 London Essays in Economics, Prof. L. Robbins, p. 105.

2 Theories of Production and Distribution, Dr. Cannan, p. 131.

3 Prof. Adarkar's article on "Optimum Population" in the Proceedings of the 2nd All-India Population Conference, 1939. For the discussion on the Optimum, I have amply drawn upon it.

4 "Whether the optimum population rises or falls it would seem impossible to state on deductive grounds. Much statistical and other analysis of the facts is necessary. As the optimum itself, in the absence of any exact statistical measure, can only be vaguely defined the statistical position is on the whole at present far from satisfactory. This is not to say, however, that the conception must be abandoned. While world or national optima may be unattainable measures, the combination of many lines of research in smaller regions or even in certain national territories as a whole, may make it possible to arrive at certain measurements of trends in the various factors concerned." Population and Agriculture, with Special Reference to Agricultural Over-population League of Nations, European Conference on Rural Life 1939, Document No. 1, p. 24.

Some criticisms have necessitated refinements of this theory. It is pointed out that no country is geographically water-tight. Thus the optimum numbers of a country are also a function of the economic conditions of production elsewhere. From this it appears that homogeneous geographical regions are better suited for such a study than political units.<sup>1</sup> This suggests regional studies, a suggestion very encouraging to the approach adopted in this publication.

It will be fruitful at this stage to take cognizance of certain developments in the field of human biology, for they have an important bearing on all population problems. Dr. Raymond Pearl has advanced the claim that populations grow and decline according to a biological law and largely irrespective of economic and social factors.<sup>2</sup> Growth occurs in cycles. "Within one and the same cycle, and within a specially limited area, a universe, the population first waxes in its speed of growth and then wanes. The rate of development depends upon the absolute size of the population that it has already attained and on the amount, still unused or unexpended, in the given universe (or area) of actual or potential resources for the support of growth".

Pearl's Logistic Law of population has, however, dwindled somewhat in significance because of criticisms. The events of recent years have shown the shortcomings of this law. Professor Bowley has shown that the data based on human populations for the verification of the logistic curve are too inadequate and can be as successfully fitted into both the Malthusian curve (geometrical progression) as well as into a hyperbola.<sup>3</sup> Again, the claim that, economic and social forces do not sensibly influence the growth or decline of populations, is too absolute to be true. As Professor

<sup>1</sup> The League of Nations Report (quoted above) also corroborates this. After making the point that the discussion of the optimum is an enquiry into the standard of living per capita, it goes on to say: "In the United States elements commonly used for the measurement of the standard of living include electric light and heating, laid-on water supply, telephone, radio, automobile and facilities for participation in organized recreation. When these standards are compared with those of even the most advanced European areas it becomes clear how far the optimum is a regional, or at least a national matter . . . The definition of the optimum, it will be seen, depends (also) very largely on political and social ideals". European Conference on Rural Life, 1939 League of Nations, Document No. 1, p. 24.

<sup>2</sup> "Perhaps the most impressive thing which has come out of the statistical study of human population is the evidence that, the steady onward march of this growth is not sensibly influenced by the host of economic and social events, which are supposed by logical necessity to affect it". Dr. Raymond Pearl, Proceedings of the World Population Conference, 1927.

<sup>3</sup> Presidential Address, Royal Statistical Society, Vol. 88.

J. B. S. Haldane observed, at the World Population Conference of 1927, "I think that if the Great War and the Russian Revolution do not seriously upset the growth of population it is very difficult to imagine what will." Dr. Pearl admitted the charge and confessed that his law was valid only if, fertility and other conditions remained the same. It must be, however, recognised that population problems are primarily biological problems and that both the biological and the economic factors must be given their due consideration. For, as Professor Pigou has put it, "Environment, as well as men, have children."<sup>1</sup>

Along with this theory, the theory of the dynamics of population has developed considerably during recent years. Intensive research and analysis of population growths have resulted in the forging of a finer apparatus of population analysis, at the hands of Dr. R. R. Kuczynski. This theory is mainly concerned with the replacement rate of populations, i. e. whether in a given population, fertility and mortality trends remaining the same, one mother in the present generation will be replaced by another mother in the next generation. From specially collected data gross and net reproduction rates are calculated, which give a considerable insight into the dynamics of the given population. This finer technique is valuable. Its application, however, requires a mass of specially collected data, which are not available in the case of many populations.<sup>2</sup>

The problem of population in India is really baffling in its variety and content. The spectacular growth of numbers during recent years and a growing pauperisation of the bulk of our population, have made it more complicated. The cry of over-population has been ringing in our ears for so many years, that we are at last beginning to wonder, whether such a state of things really exists. The path of a scientific inquiry in this respect is beset with grave pitfalls. The dearth of statistical material has worsened the task!

The haunting spectre at all such discussions is the problem of Indian over-population. A majority of all such writings are inspi-

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<sup>1</sup> Economics of Welfare, Pigou p. 115. Dr. Raymond Pearl comes to the same conclusion in his recent work. He writes—"The relation between organism and environment is everywhere and always mutually reciprocal, and as man is the most highly differentiated, and manifoldly diverse in his capabilities of all organisms, so also in his effective environment the most complicated." Natural History of Population, Dr. Raymond Pearl, 1939, p. 11.

<sup>2</sup> Where there are no such specially collected data, the method of Dr. Burgdorfer is now-a-days applied. This method is applicable to data usually available. This has been applied to some regions in this publication. For the method see Appendix I.

red by the sole purpose of proving that India is or is not over-populated. The alarmist is always with us. Some raise the bogey of the scarcity of food supply in relation to the growing population.<sup>1</sup> Some others overrate the food-producing capacity of India.<sup>2</sup> The problem is sometimes discussed as if it were only a question of encouraging health measures, or else, as propaganda for birth control. While some are shouting themselves hoarse against birth control,<sup>3</sup> there are others who insist that death control must have precedence over all other things.<sup>4</sup> The main problem is many times side-tracked and it remains as vague as before.

The story does not end there! Thus a curious misunderstanding of the optimum theory seems to be common to many writers on Indian population. An attempt<sup>5</sup> has been made to show that during the last thirty years wealth has increased faster than population in India. The conclusion drawn, of course, is that India is not over-populated. This claim is false. To prove that a particular country (India in this case) is not over-populated, "it needs to be proved not merely that average welfare is rising, but that it is rising faster, than it would have done if population would have grown more slowly."<sup>6</sup>

Another contention often put forward is that, real income per head is rising in India. This also proves nothing even if the claim were true. As Professor Adarkar has observed, "As between two dates real income per head might rise, but that does not mean at all that the mal-adjustment between the relevant optimum and actual numbers is any the less. In the case of India, for example, an attempt has been made to show that real income per head has actually risen between 1900 and 1930; but this cannot mean necessarily that there has been a movement towards the optimum, for in view of the new stage of arts, the optimum itself has shifted."<sup>7</sup>

Another tendency, to which I have drawn attention already, is that of neglecting biological considerations. The factors that in-

1 Food Planning For Four Hundred Millions: Mukerjee, 1938.

2 Growth and Distribution of Population: S. Vere Pearson, 1936.

3 Prof. Fernandes, Modern Review, December, 1938; also Prof. Menon: Modern Review, March, 1936.

4 Prof. Findlay-Shirras, Article in the Times of India on "India's Biggest Economic Problem" 10th November, 1938.

5 Poverty and Population in India: D. G. Karve, 1937; also Professor P. J. Thomas, Indian Journal of Economics, (Conference Number) April 1935, pp. 737-747.

6 "A word for the Devil", D. H. Robertson, Economic Journal, 1923,

7 Professor Adarkar, Op. cit.

fluence the so called "movement of the population," such as birth and death rates, the expectation of life, etc. are often treated in isolation. The impression seems to be that they work independently of one another. A few attempts have been made to treat any correlations between them as non-existent.<sup>1</sup> The neglect of such considerations has given rise to curious theories regarding the growth of population in India. Among these may be found the much favoured theory of the zigzag growth of Indian population.<sup>2</sup>

There is probably no other subject on which more nonsense is talked and written than the forecasts of population growth in India. This aspect of the population problem is a very tempting field for sweeping generalisations and prophetic predictions. Many writers (almost all the Census Commissioners and Superintendents from 1881 to 1931) have banked on the "age group theory" of the Swedish statistician, Sundburg, for asserting whether a population is progressive or stationary. Dr. Kuczynski has levelled a straight blow at such slip-shod theorising by destroying the very foundation on which it stands. In this connexion his remarks with regard to Colonial Census Reports in general are very instructive and equally applicable to the Indian Census Reports. He writes: "It is easy to understand that the authors of colonial reports are tempted to draw far-reaching conclusions from the scanty population data at their disposal. But the extent to which many of them yield to this temptation is appalling. It thus has become almost a universal habit to use the ratio of children to adults as a gauge of fertility, mortality, or population growth. Although a brief glance at a few life tables shows that this ratio may be extremely low or extremely high in a stationary population, it has become an axiom for most authors of colonial reports that a high ratio of children to adults is a proof that, the population is increasing rapidly and that a low ratio is a proof of a declining population. Many of them believe further that a high ratio of children to adults is a proof of a low child mortality, while it requires not more than a little commonsense

1 Poverty and Population, Karve, 1937; p. 41.

2 Professor Brij Narain writes: "When the percentage increase in our numbers during the past 60 years is plotted on a chart, the curve is seen to rise and fall in alternate decades and has the shape of -W-.

...It is evident that the growth of numbers in India is subject to inexorable laws. The action of these laws is so reliable that we can confidently make the melancholy prediction that the rate of growth of the preceding decade will not be maintained in the present decade (1931-41) or that the growth of numbers in the coming years would be cut short by disease, or famine, or both." Tendencies in Recent Economic Thought, Brij Narain, 1935, p. 18,

to realise that, other things being equal, a country with a high child mortality is bound to have a higher ratio of children to adults than a country with a low child mortality."<sup>1</sup> This is decisive and needs no comment.

If we are to arrive at some fruitful conclusions regarding this intricate problem of Indian population, we must approach it realistically and with an open mind. For social sciences, to borrow a brilliant analogy from Mr. Aldous Huxley,<sup>2</sup> "unlike the Earth, are not round but flat and no amount of walking in the opposite direction will ever bring us to the goal. As an humble attempt in that direction, my first submission is that the problem of population in India should not be discussed for the country ~~as a~~ whole. It must be approached regionally. India is a subcontinent of enormous size containing all varieties of religions, races, creeds, cultures and climatic regions. Though the whole of it is predominantly agricultural, agriculture is practised under diverse conditions, in different parts of it. From the agriculture of the irrigated desert of Sind, we find all the varieties, down to that of the most fertile lands of East Bengal and Travancore. Permanent famine tracts alternate with regions where famine is unknown. There are regions which yield a single crop in a year while there are others that harvest four crops annually. Where the principal means of livelihood is practised under such greatly dissimilar natural conditions, it is patent that a regional approach is more realistic and pertinent.<sup>3</sup>

Again, statistics, and especially vital statistics, for various provinces in India show such a wide degree of divergence that it appears very doubtful whether the Law of Averages (generally followed for computing all-India figures) gives a correct picture of the country as a whole.<sup>4</sup> A discussion on an all-India basis has a

1. Colonial Populations: Dr. Kuczyaski, 1937, pp. xii.

2. End and Means, Huxley, 1938.

3. Mr. Justice M. G. Ranade treated this problem regionally in his essay "Twenty Years' Review of Census Statistics" in Essays on Indian Economics, 1898.

4. In this connexion the following passage from the report of the League of Nations is instructive. "In practically no country is the condition of the agricultural population in its entirety either good or bad . . . When data for whole countries are assembled the differences are largely neutralized and the results obscure the problems that are being considered. The general adoption of the regional method is essential for advance in research on the man-land ratio and its adoption in population studies may also be expected to make possible a much more accurate appreciation of the problem of the optimum." (Population and Agriculture, with Special Reference to Agricultural Over-population, European Conference on Rural Life, 1939. Technical Documentation, Document No. 1, p. 26.)

plausible but a false ring! In a land of wide regional contrasts, the population problem must be approached regionally. For there is not one Indian population as such, but there are many Indian populations. As was indicated earlier, a correct optimum theory even sanctions such an approach. It applies more appropriately to regions in a country like India, where in spite of the rails and roads, there is a great degree of isolation, in rural parts.

Such regions should not be political or racial but geographical. The reasons for such a choice are cogent. Political boundaries are mysterious. They are generally drawn without much geographical reason. "Involved in any analysis of society are three major factors : the geographical setting, the population and the culture. They bear close resemblance to three of the economists' main factors of production : namely land, labour and capital."<sup>1</sup> Dr. B. N. Ganguli has observed : "In a predominantly agricultural country like India the adjustment of population to economic resources and possibilities depends upon the suitability of the land for direct or indirect production of the means of subsistence. But the productivity of land varies from one region to another according to changes in the natural environment."<sup>2</sup> Taking this fact into consideration "if we visualise the problem of, what Professor Bowley calls 'the adequacy of cultivation' at a given stage of economic culture and agricultural technique, the growth and the distribution of population have to be viewed in a geographical and regional setting. If this method of approach is not followed, and if the population to which the area is correlated represents a heterogeneous total, we obviously confuse the variability of natural environment governing agricultural and economic enterprise with the 'adequacy of cultivation' and the population capacity of a particular region. In fact the merit of such a method of approach is that it reveals the limiting factors of population growth so far as they are traceable to man's agricultural-economic environment."<sup>3</sup>

A region has been defined "as an area in which the conditions of physical environment are essentially similar throughout as are also the human adaptations to these conditions, while both environ-

<sup>1</sup> People of Kansas, Clark and Roberts, Kansas State Planning Board, 1936, p. 3.

<sup>2</sup> Economic Problems of Modern India: Ed. Prof. Radha Kamal Mukerjee (1939); An article by Dr. B. N. Ganguli on "Agricultural Regions in India," p. 3.

<sup>3</sup> The Trends of Population and Agriculture in the Ganges Valley, by Prof. B. N. Ganguli, 1938, p. X.

ment and human activity are different from adjoining areas."<sup>1</sup> In short a region is a natural unit, whereas political boundaries mark artificial units which as a rule do not follow natural boundaries. The theoretical significance of a region with its close-knit economy and uniqueness of folk-culture is likewise making a deep impression on social scientists, and is increasingly being reflected in their point of view.

Such a study can be attempted in India. Here there are different natural regions with their distinguishing characteristics. The natural regions in India are mainly rainfall tracts. For as Professor Hodson observed, "In India the soil itself counts for very little as compared with the rainfall and the physical configuration."<sup>2</sup> The importance and decisive character of rainfall in a tropical land cannot be exaggerated.

In a predominantly agricultural country like India "cropped land reflects," according to Samuel Van Valkenberg, "the complex of physical factors—relief, climate and soil particularly — so dominantly that other elements in the environment can almost be considered negligible."<sup>3</sup> The extent of cropped land depends on two factors of the environment viz. soil and rainfall, which are uncontrollable factors, by and large. In this country the distribution of soils shows much less regional variation than the amount and the distribution of rainfall. Though a certain variety of soil leads to the importance of a certain class of crops yet on the whole that importance springs from predominantly climatic factors. Thus throughout the Gangetic Plain the soil is basically the same and different classes of crops are grown according to rainfall conditions, in various parts of it.

Moreover the efficiency of the soil itself, with respect to physical and chemical conditions and the supply of plant food is determined by rainfall and temperature.<sup>4</sup> A study of the

1 K. C. Murray—"A detail of Regional Geography" in Methods in Social Science, p. 233, 1931, University of Chicago Press.

2 Census Ethnography, India, 1901-1931, p. 2.

3 "Agricultural Regions of Asia", Part IV: India : Samuel Van Valkenberg, Economic Geography, April, 1933, p. 112.

4 The microbial activity in the soil plays an important role in the growth of plants. Moisture is very necessary for the growth of the microbial populations. Moisture in the soil, of course, depends upon rainfall. Microbes by the Million, Dr. Hugh Nicol, Pelican Special, 1939. Also, Martin Leake's Basis of Agricultural Practice and Economics in G. P. The following is also interesting in this connexion. "Geographers now emphasise the hydro-sphere rather than the litho-sphere in the forefront of their studies. Civilization is essentially water-borne and both physical and human geography are concerned with the carriage and storage of energy on the surface of this earth and the vehicle is the Protean element, water." H. J. Mackinder: The Human Habitat, Presidential Address to the Geography Section at the meeting of the British Association, 1931.

geographical distribution of species also shows that the climatic factor is more important than the soil factor. As the certainty or the uncertainty of rainfall has very far-reaching effects on agriculture in this country and through it on the movement of population, it is patent that rainfall tracts are the proper basis for population studies in India.

The following regions have been discussed in the following pages :

- (1) Brahmaputra Valley (2) Surma Valley (3) East Bengal
- (4) West Bengal (5) North Bihar (6) South Bihar (7) Chota Nagpur Plateau (8) Orissa (9) Indo-Gangetic Plain, East, (10) Indo-Gangetic Plain, Central (11) Indo-Gangetic Plain, West (12) Central India Plateau (13) Submontane Punjab (14) North-West Dry Area, Punjab (15) Sind (16) Gujarat (17) Bombay Deccan (18) Konkan (19) Travancore (20) Cochin (21) Madras East Coast, South (22) Madras East Coast, North.

A large number of these are situated in river valleys. The natural boundaries, therefore, of many of them shade into one another, but they have all of them their own distinctive characteristics. These regions taken together constitute a fairly representative sample of India. This, however, does not mean that the regions left out in this publication are unimportant. They were left out, firstly, not to make the discussion unnecessarily burdensome, and secondly, to avoid repetition, as the regions that were left out did not present any types distinctly different from the types of regions that are included in this publication. The regions left out are in many respects similar to those that are included. For instance, the two natural regions of Bengal, Northern and Central Bengal, are left out but, for all practical purposes both of them conform with West Bengal, which is included. So also Madras Deccan (excluded) is represented by Bombay Deccan (included). Indo-Gangetic Plain West (Punjab) is only the other part of Indo-Gangetic Plain, West (U.P.). The latter has been included and the former left out.

## CHAPTER II

### The Political Arithmetic of Regions

In a regional study, such as is attempted here, it is necessary to describe every region under consideration and present the available regional data, scattered in numerous places, in a compact form. The following pages have been written to meet that necessity. The available facts and figures have been stated in them. It was not possible to comment on each single item. Chiefly a compilation of facts is attempted here. The deficiencies are, of course, many but it is hoped that they will not make an appreciable difference in presenting a true picture of regional conditions.

A certain method has been followed in the following pages while dealing with every region. The following is a brief statement of the method, and the why and the wherefore of some of the items included in it.

The area of a region is given at the top together with the region's total population in 1931. Where the figures of the 1941 census enumeration were available, those were also given. It must be understood, however, that, in all cases, the 1941 figures are "provisional". The area of a region is in all cases the census area. At times it differs from the actual survey area but the differences are negligible. The region is then defined and its boundaries are indicated. The physical configuration of the region, its rivers, mountains, soils, etc. are then described. Its climate is then discussed, with special reference to rainfall, which is a factor of decisive importance in the agriculture of a region. The reliability and distribution of the rainfall are particularly emphasised. This leads to a discussion of the available agricultural water supply, natural and artificial, and further possibilities of artificial irrigation in that region. The actual agricultural situation is then discussed with the aid of agricultural statistics for the years, 1911, 1931 and 1936 (the latest year for which the complete Imperial compilation was available). The figures for 1921 could not be given regionally as district figures for that year were not available. The figures are for cultivable, cultivated, double cropped and irrigated areas in the region. Statistics regarding these items are also given in the Census Reports and these have also been quoted. They are for the years 1911, 1921, 1931. The census statistics are, however, blatantly wrong in many cases. The agricultural statistics taken from the

Agricultural Statistics of India, published by the Government of India, are therefore taken as the basis of all the subsequent discussion. The census figures have been given here only to demonstrate their unreliability in many instances. "Cultivable" area is a vague and unreliable category.<sup>1</sup> Stress has been laid therefore on the actual area cultivated. The extent and the possibilities of double cropping are discussed.

This is followed by a discussion about the crop distribution in the region for which also agricultural statistics for the years 1911, 1931, 1936 and census statistics for the years 1911, 1921, 1931 are given. As previously, the former are the basis of discussion. The respective importance of crops is discussed and additional figures for some important crops are given.

It should be borne in mind, however, that these statistics present periodic pictures and hence they may sometimes conceal trends as well as reveal them. Therefore in the following pages when there is a remark regarding decline or growth, say since 1911 or 1921 etc. it does not necessarily mean that the movement was continuous. The remark should only be taken to mean that in 1911 or 1921 the area was larger or smaller than that in 1921 or 1911, as the case may be.

There follows a discussion of the region's mineral resources. This should lead to a description of the region's occupations and its industrial development. The occupational statistics of the Census Reports, though available regionally, are utterly unreliable and are not comparable from Census to Census. So it was not possible to use them. This deficiency has been made good to some extent by giving figures of the average daily employment in large industrial establishments in a region for the year 1937 (the number of cotton gins refers to the ginning season 1937-38). Such statistics are available over a series of years but their classification and compilation have changed frequently. They are therefore not comparable as from decade to decade. It was therefore not useful to give these statistics for different decades. Here they have been given only for the year 1937, because they were the latest figures available. The industrial progress of a region can also be gauged from the growth of its urban population. The figures of persons living in towns in each region at various censuses are given in a separate table at the end of the chapter.

<sup>1</sup> Vide A Scheme for the Economic Census of India ; Bowley-Robertson, 1934.

The density figures are then discussed. These figures are for the total area. At the end of the chapter a separate table is given in which density per square mile of cultivated area in the region is given. The cultivated area is again taken from agricultural statistics.

Next comes the discussion on the migratory movements of the region's population. In discussing these the available migration statistics or birth-place statistics have been used throughout. These have their limitations. For they give only the net result of migration during a decade. There is no record of the migratory movements, annual or seasonal, that might have taken place during the dates of the two censuses. They also do not indicate as to how many immigrants have entered and how many emigrants have left during the period. They only give the net balance inward or outward, resulting from these opposed movements. Due to this deficiency only very brief remarks were possible in the case of some regions. This deficiency has been discussed at length in Chapter V.

The sex-composition of the region's population is then discussed with the aid of figures. Some remarks on the age-composition of the population follow. In most cases the remarks on the age-composition are those made by the various Census Superintendents. These remarks have been reproduced here for whatever they are worth. The figures regarding various age-groups in a region's population are embodied in a separate table at the end of the chapter. The figures in this table are divided into four age-groups; to wit, 0-15, 15-40, 40-60, 60 and over. The figures have been given for both the sexes separately. The significance and the choice of these age-groups need not be emphasised. The age statistics in Indian Census Reports are very defective for each single year of age or for five year periods. They are, however, largely correct in aggregate totals for 15 to 20 years and more. The choice of age-groups was obviously dictated by these considerations. The results of the 1931 fertility enquiry were available in the case of a few regions. They have been quoted at their proper place. A further refinement of the available data has been attempted in a few cases.

Birth-rates and death-rates are available in Indian Census Reports regionally. The defective character of the Indian vital statistics however, is proverbial. "The only vital statistics available in the country consist of the records of decennial Censuses of registered figures for births, deaths and a few of the important infectious diseases. They often suffer from incomplete and defective recording. The system of registration, collection, compilation and

presentation of vital statistics varies from Province to Province, and so does also the degree of their accuracy. Compulsory registration has not yet been introduced all over the country, whilst the 'Compulsory' areas vary in extent from Province to Province. Special inquiries have made it possible to estimate the nature and the extent of the errors that exist in the recorded vital statistics. The defects are both quantitative and qualitative . . . In the Madras Presidency, intensive inquiries carried out a few years ago showed that whilst in certain towns the registered birth-rate was as low as 5 per mille, the actual birth-rate for urban and rural areas averaged 42.5 per mille. The same inquiry also revealed that compilations were frequently made in a grossly careless manner ; for example in one district, only 25 per cent. of the total village returns were included although the figures were submitted complete for the whole district."<sup>1</sup>

For these considerations no use of the registered birth or death-rates has been made in the following pages. The expressions "actual population" and "natural population" have been frequently used. By the 'natural population' of any area is meant the number of persons living at a particular time who were born in that area, no matter where they happened to reside at the given time. It is the "actual" or the de facto population minus the number of immigrants to the area, plus the number of emigrants from that area to other areas at the time. The term "actual population" or de facto population signifies the actual number of people enumerated in a particular area on a particular day.

#### Cochin.

( Area : 1,480 sq. miles. Actual Population in 1931 : 1,205,016; in 1941 : 1,422,000 ).

Cochin is a small native State, north of Travancore and both of them are very much alike ( even in the fine quality of their Census Reports ! ). Like other countries on the south coast of the Indian peninsula, the State enjoys the benefit of two monsoons, the South-West and the North-East. From the former it gets most of its rainfall. The average rainfall per year is over 100 inches. One of the most peculiar physical features of Cochin is the line of interconnected lagoons almost skirting the sea shore.

The soil may be divided into two distinct classes. (i) The red ferruginous derived from ferruginous stones, laterite and other

1. Col. A. J. H. Russel, I. M. S., Presidential address to the Section of Public Health and Medicine, Indian Statistical Conference 1938. Sankhya, Vol. 4, Part 2. December 1938.

rocks. (ii) The arenaceous, being the flinty sand basis of littoral tracts—improved by manure and the silt of rivers. "The geological formation of the forest tract is gneiss, which is eminently fitted for luxuriant forest growth." <sup>1</sup>

The chief harvests are four known as Virippu (September to October), Mundakan (December to January) carried on with a great deal of transplantation; Punchal (March to April) and Ko'le (April to June). The last named is peculiar to Cochin, Travancore and Malbar and means the cultivation of paddy in the fresh water lakes after draining away the water. A good Ko'le crop often saves the State from the effects of other bad harvests. Leaving the fields fallow is almost unknown, except in the case of Ko'le lands.<sup>2</sup>

The agricultural situation in Cochin can be studied from the following figures. The first table is taken from the Census Reports and the second from the Agricultural Statistics of India.

TABLE — Agricultural Statistics (Census Reports)

Year	Percentage of Total Area		Percentage of cultivated area
	Cultivable	Cultivated	
1911	0.80	56.24	4.08
1921	0.10	56.00	36.40
1931	54.20	51.70	63.20

TABLE — Agricultural Statistics (In acres).

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	493,350	465,980	202,984	73,042
1921-22	502,845	493,853	270,753	27,817
1931-32	519,517	502,182	337,251	52,578
1935-36	503,737	468,242	344,579	60,532

The figures for the different years in the former table are obviously not comparable. The figures in the latter table show that the

1 Census Report, Cochin, 1901, p. xxxii.  
Census Report, Cochin, 1901, p. xxxiv.

area under cultivation in 1931 was larger than it was in 1921 or 1911. But the cultivated area in 1935-36 was less than in 1931 and was slightly more than that in 1911. Irrigated area has increased from 202,984 acres in 1911 to 344,579 acres in 1935-36. The area cropped, more than once was less in 1921-22 than in 1911-12. Though it increased in 1931-32 and in 1935-36 the 1911-12 level was not reached.

The distribution of crops can be studied from the following figures.

TABLE — Crops ( Census Reports ).

Percentage of Gross Cultivated Area under ..				
Year	Rice	Wheat	Pulses	Other Crops
1911	42.08	...	...	57.92
1921	47. 4	...	10.6	42. 0
1931	64. 2	...	1.8	34. 0

TABLE — Crops ( Agricultural Statistics )  
Acreage under

Year	Rice	Total Food Grains	Oil Seeds
1911-12	294,779	338,930	10,495
1921-22	265,643	321,014	28,893
1931-32	262,039	319,084	86,016
1935-36	265,624	312,238	80,190

The figures bring out the predominance of the rice crop. The latter table shows that the area under rice was less in 1921-22 than in 1911-12. It was almost the same in 1931-32 and 1935-36 as in 1921-22. The former table wrongly shows that the area under rice was more in 1931 than in 1911 or 1921. Or perhaps the figures are not comparable. The area under oilseeds, which mostly means cocoanut in Cochin, in 1921-22, was double that of the area under oilseeds in 1911-12. But the 1931-32 figure is three times that of 1921-22. The 1935-36 figure is slightly less than that of 1931-32. The cocoanut cultivation seems to be flourishing all along.

In Cochin, and generally on the South-East Coast of the Indian Peninsula, "there is a sound economic basis of two food crops, rice

and millets. Rice is grown on low-lands. As the land rises there is garden cultivation yielding spices, condiments, sugarcane, cardamom and betel. On the poorer dry soils, above the zone of garden cultivation, are found the *ragi* fields. Cocoanut is also intensely cultivated in all parts of this tract.<sup>1</sup>

In such a region of rich agricultural possibilities the density of population is naturally great.

	1941	1931	1921	1911	1901	1891	1881
Density per square mile.	961	814	662	620	549	488	406.

The density figures have more than doubled during the last 60 years. Prof. T. E. Hodson mentions Cochin as a country "with areas here and there carrying over 2,000 and in one rural unit actually 4,090 persons to the square mile on land producing rice and cocoanut, primarily the latter".<sup>2</sup>

Cochin illustrates the now well-known fact that high densities go together with the intensive cultivation of rice and cocoanut. "The large growth and the high density in a tract, mainly agricultural in its economy, has been made possible by the extreme simplicity of the way of living that prevails amongst its (Cochin's) people."<sup>3</sup>

There are a few minerals worked in Cochin. Laterite and granite are found in marketable quantities. Traces of iron are common. Mica is met with in many places.<sup>4</sup>

The following figures give the average daily employment in the large industrial establishments in Cochin, in 1937.

	Perennial	Seasonal
I Textiles :	1,081	...
II Engineering :	373	...
III Minerals and Metals :	...	...
IV Food, Drink and Tobacco :	749	...
V Chemicals, Dyes, etc. :	1,336	...
VI Paper and Printing :	...	...

1 "Agricultural Regions of India", Dr. B. N. Ganguli, in "Economic Problems of Modern India," 1939, p. 28.

2 Census Ethnography : 1901-1931, p. 2.

3 "A Study in Differential Fertility", by Prof. D. Ghosh and Rama Varma, Report of the Second All-India Population Conference, 1938, p. sa 38.

4 Census Report, Cochin, 1901, p. XXXIV.

		Perennial	Seasonal
VII	Processes relating to Stone : Wood and Glass :	1,260	...
VIII	Processes connected with Skins and Hides :	...	...
IX	Gins and Presses :	...	...
X	Miscellaneous :	602	71

Cochin contains flourishing plantations of tea and rubber. The first rubber plantations were started in 1905 on the Pilapilli hills. The acreage under rubber has increased ever since. In 1931 there were seven rubber plantations with an aggregate area of about 10,000 acres. In 1939, 13,710 acres were under rubber and the total production during that year was 3,721,928 lbs.<sup>1</sup>

There are coffee plantations also. In 1862-1870 about 9,470 acres were leased out for coffee on the Nelliampathi hills. "Most of the coffee is exported, and owing to the want of transport facilities the acreage under cultivation has been decreasing and today there are about 6,000 acres under coffee".<sup>2</sup> Tea is displacing coffee to a certain extent. In 1935-36 coffee occupied only 2,072 acres. The acreage under tea has increased greatly.

#### Average acres under Tea in Cochin.

1925-1929 :	296 acres.
1930-1934 :	964 acres.
1935-1936 :	2,597 acres.

Leather, cotton weaving, coir manufacture and ceramics also exist on a small scale in Cochin. Cocoanut oil-pressing, once a very flourishing concern in the State, is declining of recent years due to the competition from Ceylon.

The age composition of the population of Cochin has changed from decade to decade. "The main increase during the past decade (1921-1931) is in the period 0-10. At the Census of 1921 the position was less favourable, the highest increase being in the age groups, 10-15, 40-60 and 60 and over; while the decade 1901 to 1910 showed the least favourable condition in that the greatest increase was at ages 60 and above."<sup>3</sup>

1 Indian Rubber Statistics, 1939.

2 Census Report, Cochin, 1931, p. 862

3 Census Report, Cochin, 1931, p. 51.

The social structure of Cochin is the same as that of Travancore. Inheritance is through the female line. The following is the proportion of females to males.

Number of females per 1,000 males.	1941	1931	1921	1911	1901	1891	1881
(Actual Population)	1,043	1,043	1,027	1,007	1,004	998	989

The females preponderate and the tendency towards such a preponderance seems to be on the increase.

The special inquiry that was instituted, at the time of the 1931 Census, revealed that in Cochin there were 3.76 children born per family.<sup>1</sup> The average number of surviving children, per family, was 2.76.

#### Travancore

(Area : 7,625 sq. miles. Actual Population in 1931 : 5,095,973 ; in 1941 : 6,070,790.)

The State of Travancore lies at the southern end of the Indian Peninsula. Its total area amounts to 7,625 sq. miles out of which 2,500 sq. miles is covered with thick tropical jungle and 2,000 sq. miles more consists of hilly grass land. It contains a long strip of the fertile coast plain with many inter-connected water lagoons and a part of the Western Ghats.<sup>2</sup>

The rainfall is very heavy in Travancore. The greatest quantity brought by the south-west monsoon falls between May and August. The average annual rainfall is over 100 inches. A dozen principal rivers, with their tributaries and ramifications, intersect the country in all directions.

" Practically the whole of Travancore, except three talukas in the extreme south and Shenkotta, has a sufficient rainfall and some parts have even more than what is necessary. In the three southern talukas the deficiency is made up by artificial irrigation from the Kothyar project, and in Shenkotta by tank irrigation. In most other talukas the only defect in the rainfall is its uneven distribution and in some talukas excess rather than deficiency damages cultivation."<sup>3</sup>

The soil of the country differs in different localities. "That along the coast is fine whitish sand with a mixture of calcarous

<sup>1</sup> Census Report, Cochin, 1931, p. 79.

<sup>2</sup> Imperial Gazetteer.

<sup>3</sup> Census Report, Travancore, 1931, p. 14.

clay as a lower stratum, combined with vegetable matter ; that in the lower parts of the valleys consists generally of a brownish coloured clay, often porous and permeable and in some places, stiff and hard to work ; that in the upper-lands reposes on a basis of laterite which frequently appears superficially in large masses."<sup>1</sup>

The general agricultural situation in Travancore can be studied from the following figures.

TABLE — Agricultural Statistics (Census Reports).

Year	Percentage of Total Area.		Percentage of Cultivable area.		Percentage of Cultivated area.
	Cultivable	Cultivated	Cultivated	Double Cropped	Irrigated
1911	61.23	45.43	74.19	7.44	17.90
1921	64.17	41.17	63.84	7.5	61.02
1931	62.34	45.10	72.33	7.94	16.65

TABLE — Agricultural Statistics (in acres).

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	2,593,370	1,909,082	844,500	203,091
1921-22	3,089,082	1,951,772	1,369,965	...
1931-32	2,967,538	2,123,016	1,226,495	14,709
1935-36	2,720,393	2,206,539	814,720	...

The latter table clearly shows that cultivated area in 1931-32 was larger than that in 1911-12 or 1921-22. In 1935-36 it was even larger than that in 1931-32. The statistics of the former table give the erroneous impression that the cultivated area in 1911 was larger than that in 1921 or 1931. The irrigated area in 1921-22 was larger than that in 1911-12 or 1931-32 or 1935-36. In 1931-32 it was larger than that in 1935-36. According to the latter table the double cropped area had shrunk from 203,091 acres in 1911-12 to 14,709

<sup>1</sup> Imperial Gazetteer,

'acres in 1931-32. The figures in the former table give a wrong impression with regard to this item also.

The crop distribution in Travancore can be studied from the following figures.

TABLE — Crops (Census Reports).

Year	Percentage of gross cultivated area under							
	Rice	Palms	Other trees		Miscellaneous			
1911	29.39	6.64	1.93		62.04			
	Rice	Cocoanut	Tapioca	Pepper	Rubber	Tea	Sugarcane	Others
1921	33.6	20.31	18.0	2.18	2.27	2.10	0.24	21.7
1931	36.2	21.5	18.9	4.2	3.4	3.3	0.4	12.1

TABLE — Crops (Agricultural Statistics).  
Acreage under

Year	Rice	Total Food Grains	Oil Seeds
1911-12	815,428	1,207,360	170,172
1921-22	648,610	648,610	455,970
1931-32	780,340	780,340	549,167
1935-36	691,133	691,133	578,317

Rice is the staple food crop. The area under rice in 1911-12, was more than that in 1921-22, in 1931-32, or in 1935-36. The figures in the former table are obviously not comparable. The area under oil-seeds, (which is nothing but cocoanut in Travancore) in 1911-12 had more than trebled in 1931-32. In 1935-36 it was more than that in 1931-32.

Cocoanut, a staple food crop, which is also a good commercial crop, is intensely cultivated in Travancore. Special crops of importance in the State are tea and rubber. Coffee is a minor crop. Figures for these are given later on. "The combination of cash crops like paddy and tapioca and money crops such as cocoanut and pepper, maintain an exceedingly dense population in Travancore."<sup>1</sup>

It has been truly remarked that "it will be difficult to name another land which within so narrow limits combines so many, so varied and such precious natural blessings."<sup>2</sup> In such a region the density of population is necessarily high, as can be seen from the following figures.

	1941	1931	1921	1911	1901	1891	1881
Density per square mile	796	668	525	450	387	335	315

The density figures have more than doubled during the last 60 years. In some parts of the State, however, the density is still higher. "For example, in the low lying tracts of Travancore, where the proportion of food-crops (paddy and tapioca) and money crops cocoanut and pepper to gross cultivated area is as high as 89.3 per cent, the population has reached a density of 2,186 persons per square mile."<sup>3</sup>

All the minerals in Travancore have not been explored. Plumbago is the only mineral worked to some extent.<sup>4</sup> Mica of superior quality is found in various parts of the country. It is the crimson variety of mica. Graphite also occurs in the State.

The following figures give the average daily employment in large industrial establishments in Travancore, in 1937.

	Perennial	Seasonal
1 Textiles :	855	40
2 Engineering :	260	...
3 Minerals and Metals :	2,130	...

1 Food Planning for Four Hundred Millions, Mukerjee, 1937, p. 89.

2 Imperial Gazetteer.

3 Dr. Ganguli "Agricultural Regions of India" in "the Economic Problems of Modern India", p. 28.

4 Imperial Gazetteer.

	Perennial	Seasonal
4 Food, Drink and Tobacco :	650	2,428
5 Chemicals, Dyes, Etc. :	790	100
6 Paper and Printing :	398	...
7 Processes relating to Stone, Wood and Glass :	2,158	...
8 Processes relating to Hides and Skins :	...	...
9 Gins and Presses :	...	...
10 Miscellaneous :	13,006	52

Tea, rubber and cardamom plantations are flourishing concerns in Travancore. The growth of Tea plantations in Travancore can be seen from the following figures.

Acreage under Tea, Average for	Acres
1900-1904	24,931
1910-1914	34,555
1920-1924	48,655
1930-1934	73,729
1935-1936	77,585

In 1935-36, in Travancore 6,268 acres were under coffee. The manufacture of coir yarn is also an important industry in Travancore, inasmuch as, out of the 351,076 industrial workers 126,427 or 36 p. c. were employed in this industry in 1931. Out of the total export of Rs. 11.25 crores from the State, in 1930, coir yarn accounted for Rs. 2 crores roughly.<sup>1</sup> In 1939, rubber plantations covered an area of 100,869 acres and the total production during the year was 23,853,760 lbs.

The population supported by tea, rubber and cardamom estates numbers 21 per mille of the population of the State and consists of 75 per cent. of outsiders. The immigrants to the estates represent as much as 59 p. c. of the total immigrants to the State. Most of them are from the depressed classes.<sup>2</sup> The migration, mainly from outside the State, seems to be of the temporary or semi-permanent type. The sex ratio among these immigrants to the estates is 834 females per 1,000 males.

1 Census Report, Travancore, 1931, p. 245.

2 Census Report, Travancore, 1931, p. 34.

Travancore receives more immigrants than the emigrants it sends out. The following figures give the balance of migration in Travancore ( no allowance being made for deaths, etc.)

1891	+ 3,210		1911	+ 35,042		1931	+ 76,637
1901	+ 30,413		1921	+ 43,331			

This balance is only a small percentage of the whole population of Travancore.

The immigration is mainly to the tea, rubber and cardamom estates in the Highland Division of the State. Two reasons are given for this flow of outside immigrants. Firstly, the Tamil labourers are considered more efficient for plucking tea leaves, and secondly, the tea and cardamom estates of Travancore are inaccessible to the people of the State due to a lack of good communications. A new road has been recently opened which may solve this problem.

The proportion of females to males is high in Travancore, as in Cochin. This can be seen from the following figures.

Number of females per 1000 males (Actual population)	1941	1931	1921	1911	1901
	993	987	971	981	981

The age composition of the population of Travancore is interesting. "Of the aggregate population more than 17 per cent. are under five years of age, 30 per cent. under 10 years and more than 42 per cent. under 15 years. The number at the adult ages of 15-50 form about 48 per cent. and those above fifty a little over 9 per cent. of the total population."<sup>1</sup>

"In the absence of famines and epidemics and the influence of migration being negligible, the variations in the age distributions are mainly the result of births and deaths. The present age distribution is the accumulated effect of births and deaths of the last 60 or 70 years. The decrease in the proportion of adults is probably due to a low birth-rate or high infant mortality some 30 or 40 years ago; the increase in the proportion of old persons, to a high birth-rate 20 or 30 years earlier; the increase in children, to a high birth-rate or low infant mortality in recent years. The reduction in the proportion of the economically productive section of the population between 15-50, which is lowest at the present census, is a distinct disadvantage to the country. It may lead to a lower birth-rate during the current decade if the proportion of married women

1 Census Report, Travancore, 1931, p. 99.

of child-bearing period, does not rise. The increase in the proportion of children and old people, may, on the other hand, result in a rise in the death-rate."<sup>1</sup>

According to the fertility enquiry, conducted in 1931, the average number of children born per family comes to 6.5. The average number of children surviving per family is 4.9 (calculated from the figure of children surviving per 1,000 born which was 755).<sup>2</sup> As compared to Cochin, these figures are strikingly different. Both the States are so very similar in most respects that it is very difficult to point out the cause for this phenomenon. Some comment on it is made in Chapter IV.

### East Bengal.

(Area : 26,521 sq. miles. Actual population in 1931 : 20,690,518 ).

"East Bengal, lying to the east of the Padma and the Madhumati, is the united delta of the Ganges and the Brahmaputra, in which the creative energies of those great rivers have full and free play. It is a fertile semi-aquatic plain, rich in crops of rice and jute, and covered by a network of rivers, streams and creeks. Boats take the place of carts and water ways serve as roads. The land is subject to annual inundation and silt fertilization. The slope of the country is away from and not towards the chief rivers, and the water in the minor channels flows from and not towards the main streams."<sup>3</sup> The great rivers are building up land continuously and throwing up new alluvial formations rich in agricultural possibilities. They are less active in the northern portions of this region than in the southern portion covering the littoral tract, particularly near the Meghna estuary. The flat level of the country is only broken by a low tableland in the north-east, called the Madhupur Jungle. "Its average height above the plain is only 40 feet, but its ridges have exercised an influence out of all proportion to their height, for the hard clay of which they are composed has resisted the erosion of the great rivers and deflected them to the south-east."<sup>4</sup>

East Bengal can be divided into two zones, Northern or the inland and Southern or the littoral. The northern part is composed of old alluvium and has practically reached the limit of its agricultural development. The southern portion is a formation of the

<sup>1</sup> Census Report, Travancore, 1931, p. 101.

<sup>2</sup> Census Report, Travancore, 1931, p. 143.

<sup>3</sup> Bengal, Bihar and Sikkim, L. S. S. O'Malley, Cambridge Geography Series 1917, p. 7.

<sup>4</sup> O'Malley Op. cit. p. 8.

new alluvium and is in the process of development. The zones are very clearly defined and there is a traceable migratory movement from the Northern to the Southern zones.<sup>1</sup>

This region receives on an average a rainfall ranging from 80 to 100 inches annually. It is very regular and never fails. But the entire system of farming and agricultural security in this region depends on what is called, " river economy." This region receives heavy rainfall but " the main work of supplying moisture to the soil is done by river floods, the function of local rain being simply to swell the floods and moisten the higher lands which are more or less beyond the reach of the floods."<sup>2</sup> Heavy and well distributed rainfall combined with river floods (of Ganges and Brahmaputra alternately) make the soil fertile and better adapted to a variety of harvests. Except in marshy areas the cultivators in this region are not dependent on a single crop. " In the active delta rainfall in March, April and May and again in September and October, is so ample and certain and the floods of the rivers in June, July and August rise and fall with such regularity that both summer and winter crops can be grown on the same land and in the same season."<sup>3</sup> Hence in this region double cropping is very extensive. The following figures throw more light on the general agricultural situation in this tract.

TABLE—Agricultural Statistics (Census Reports)

	Percentage of Total area		Percentage of cultivable area		Percenta- ge of culti- vated area
	Cultiv- able	Culti- vated	Culti- vated	Double cropped	
East Bengal : (1911)	63.9	47.9	75.0	18.9	...
Dacca (1921)	72.1	65.2	90.4	20.1	1.6
Chittagong (1921)	58.5	36.5	62.4	17.9	...
Dacca (1931)	79.6	71.1	89.3	23.8	0.6
Chittagong (1931)	59.3	37.0	62.5	18.9	0.4

1 Trends of Population and Agriculture in the Ganges Valley, Dr. B. N. Ganguli 1928, p. 234.

2 Dr. B. N. Ganguli, " Agricultural Regions of India ", in " The Economic Problems of Modern India ", 1933, p. 10.

3 Dr. B. N. Ganguli, Op. cit., p. 247.

TABLE—Agricultural Statistics (in acres)

East Bengal	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	11,874,481	9,194,900	...	2,412,700
1931-32	12,218,215	9,592,300	80,818	2,852,300
1935-36	11,857,568	9,432,000	86,222	3,157,000
1940-41	12,246,672	10,161,300	92,385	6,060,200

The figures in the latter table clearly show that the area under cultivation in 1931-32, was larger than that in 1911-12, though the figure for 1935-36 shows a slight drop. In 1940-41 the cultivated area was larger than that in 1931-32. The most significant figures are regarding the double cropped area. During 1931-1941 the double cropped area has more than doubled.

In this connexion a quotation from the Census Report of Bengal for 1921 may be given. "The valuable crops in Bengal are the summer crops, which are taken up about August, and the winter rice crop, which is taken up at the end of the year...In order that a summer crop and a winter crop may be taken off the same land, the land must first of all be of a suitable level. It must not go under water more than a foot or so in September or the winter rice cannot be transplanted. Both crops will be good ones only if the former gets a good start and can be taken up early and the latter does not get weather too dry for it, after it has been transplanted. What is requisite, therefore, is not only a good rainfall in the middle of the rainy season, but also sufficient rain both early and late in the year. It is the rain coming in March, April and May, and again in September and October, that determines whether a summer crop and a winter crop can be taken off the same land. Whether a spring crop will be also taken depends upon whether the cultivator finds it worth while to put one down. Unless the winter rice has been taken up very late, one could be grown almost anywhere in Eastern Bengal".<sup>1</sup>

<sup>1</sup> Census Report, Bengal, 1921, p. 13-14.

The large amount of double cropping explains the prosperity of this region and its teeming population. The most extensive double cropping in this region is found in districts that are densely populated, for example, Dacca, Tipparah and Noakhali, where the percentages of double cropped areas to the total cultivated were 35%, 38% and 50% respectively.

The following figures show the crop distribution in East Bengal,

TABLE—Crops. (Census Reports)

Percentage of gross cultivated area under

	Rice	Other cereals & pulses	Jute	Root Crops	Sugar & Drugs	Fodder & Oil seeds
East Bengal (1911)	68.4	...	6.6	...	...	...
Dacca (1921)	79.3	1.7	9.1	2.4	0.8	6.7
Chittagong (1921)	61.3	5.6	14.8	3.4	1.2	13.7
Dacca (1931)	64.1	4.6	17.5	4.5	1.2	8.1
Chittagong (1931)	77.4	2.8	10.4	2.5	0.7	5.9

TABLE—Crops. (Agricultural Statistics)

Acreage under.

East Bengal	Rice	Total Food Crops	Oil seeds	Jute
1911—12	7,738,400	8,285,000	866,700	1,399,200
1931—32	9,407,400	9,912,500	481,700	972,300
1935—36	9,047,100	9,875,500	460,800	1,078,300
1940—41	9,091,500	9,620,200	448,900	2,063,200

Rice is the main crop. The figures, however, show that the area under rice in 1940-41 was smaller than that in 1931-32. This is perhaps due to the displacement of rice by jute in some areas, as indicated later.

Next to rice the most important crop in East Bengal is jute. It is a very valuable commercial crop and is practically the monopoly of Bengal. Jute is a crop that exhausts the soil. In East Bengal, with its moist climate and its annual fertilising deposit of river-borne silt during the rainy season, it finds its best natural conditions. Of the total jute produced in Bengal (and for all practical purposes in the world) East Bengal produces nearly 65 per cent. With the exception of Bakarganj and Noakhali, jute occupies a conspicuous place in the *Bhadoi* harvest. "Owing to the increasing pressure of the population on land and the high value of jute as a commercial crop until recent times, jute has displaced *aus* rice and other *rabi* crops to a very large extent."<sup>1</sup> This typical change can be marked in the districts of Faridpur and Tipperah. The area under jute has increased more than twice during 1931-41. The increase in the area under jute in 1941 is probably due to the increased demand for jute in the war period.

"Right combination of cash crop like cane, cotton and jute, and the heavy yielding food crops has evolved only in a few areas under the stress of economic pressure, furnishing the stable economic basis of an exceedingly high rural density. In East Bengal *aman*, jute, china or *Kaon* and gram and oil seeds maintain an exceedingly dense population."<sup>2</sup>

The density figures clearly demonstrate this.

	1931	1921	1911	1901	1891	1881
Density per square mile	688	625	577	513	463	405

The population of this region is exceedingly dense. Both the double cropped area and the area under *aman* increase and co-exist with greater rural density<sup>3</sup>.

The agricultural prosperity of this region is in contrast to its poverty in the non-agricultural sphere. East Bengal has practically no minerals to speak of.

1 Dr. B. N. Ganguli, Op. cit., p. 293.

2 Food Planning for Four Hundred Millions, Prof. Mukerjee, 1938, p. 88.

3 Prof. R. K. Mukerjee, "Concentration of Population in East Bengal," Indian Journal of Economics, October 1928.

The following figures give the average daily employment in the large industrial establishments in East Bengal, in 1937.

		Perennial	Seasonal
I	Textiles.	3,787	...
II	Engineering.	2,655	...
III	Minerals and Metals.	...	...
IV	Food, Drink and Tobacco.	259	1,368
V	Chemicals, Dyes, etc.	151	...
VI	Paper and Printing.	386	...
VII	Processes relating to Wood, Stone and Glass.	575	...
VIII	Processes relating to Skins and Hides.	...	...
IX	Gins and Presses.	...	16,694
X	Miscellaneous.	27	...

The colonisation by East Bengalees, especially Mymensinghites, in the Brahmaputra Valley in Assam, is a significant phenomenon which requires comment. The total number of these settlers in the Brahmaputra Valley in 1921 was estimated to be 300,000 (children born on arrival included). In 1931 they numbered about 450,000. What is the attraction for these settlers? The Census Superintendent for Assam in 1921 remarked that this movement had been inspired by the pressure on the soil and the actual loss of land and homesteads by diversion of the river course in the home land. The Brahmaputra Valley offered cheap, plentiful and fertile land with ryotwari settlement, as against zamindari in Bengal.<sup>1</sup> This exodus has been fully discussed in the section on the Brahmaputra Valley.

In East Bengal there has been a continuous decline in the number of females as compared with males, as can be seen from the following figures.

Number of females per 1,000 males. (Actual Population)	1931	1921	1911	1901	1891	1881
	957	963	972	980	981	998

East Bengal is a land of active rivers and open drainage. As compared to the other wet regions of Bengal it is the healthiest of all of them. In this connexion, a remark of the Census Superin-

1. Census Report, Assam, 1921, p. 38.

tendent regarding mortality trends in this tract, is interesting. He observes: "As recorded, the mortality at the ages 0-5 is lowest in the Chittagong Division and next lowest in the Dacca Division and these two divisions in the reverse order show the lowest recorded mortality at the ages 60 and over."<sup>1</sup>

The fertility inquiry conducted in 1931 gave the following figures.<sup>2</sup>

Average living births per family (with probable error)	Average survivors per family (with probable error).
5.8 ± 0.10	3.9 ± 0.07

The average number of persons per farm family is as high as 5.5 persons<sup>3</sup> in this region. A similar figure for North China is, 5.78 persons<sup>4</sup>.

#### Chota Nagpur Plateau.

(Area : 66,624 sq. miles. Actual population in 1931 : 14,451,094).

"The term Chota Nagpur Plateau is used to designate the elevated country extending from the Gangetic valley to the hilly tableland of the Central Provinces and approaching close to the Bay of Bengal on the South-east....The word plateau is a technical expression for an area of which the lowest levels are at a considerable height above the sea"<sup>5</sup> This region comprises the districts of the Chota Nagpur Division, the Santal Paraganas, Angul and the tributary States of Orissa and Chota Nagpur.

"It is a rugged region of inequalities, consisting of a succession of plateaux, hills and valleys, drained by several large rivers, such as the Damodar, Barakar, Subarnarekha, Brahmani, Baitarani and Mahanadi. The land is still largely covered by forest, and is thinly peopled. The whole area belongs to the same geological formation."<sup>6</sup> It is the home of numerous aboriginal tribes.

This region receives on an average a rainfall of 50 to 55 inches annually. In this tract the water runs quickly off the slopes so that the higher lands are soon dry, even after a heavy rain. For its conservation the slopes are laid out in a series of terraces, fields spreading downwards in a fan shape. They have earthern banks at the lower side to retain the water, which passes down from field to field, moistening each in turn. Artificial irrigation is necessary

1 Census Report, Bengal, 1931, p. 139.

2 Census Report Bengal, 1931, p. 172.

3 Prof. R. K. Mukerjee, 2nd A.I. Population Conference Report, 1938, p. SA 10.

4 Bengal, Bihar and Sikkim, L. S. S. O'Malley, 1917, p. 24.

5 Census Report, Bengal, 1901, p. 16.

in this tract for the cultivation of rice and other crops because of its rapid drainage. Well irrigation is used for winter crops.<sup>1</sup>

In this tract there are extensive areas of rock and laterite and gravel, which are unfit for cultivation, and except in the valleys, the patches of fertile ground are small and infrequent. It will thus be clear that this region has very poor chances of a prosperous agricultural development. The whole of this tract is liable to famine.<sup>2</sup>

The following figures throw light on the general agricultural situation in this region.

TABLE—Agricultural Statistics (Census Report)  
"

Year	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivated area
	Cultivable	Cultivated	Cultivated	Double-Cropped	Irrigated
1911	62.4	38.6	61.9	3.5	7.9
1921	56.8	31.0	54.6	3.9	12.1
1931	57.1	30.4	53.2	4.4	10.2

TABLE—Agricultural Statistics ( in acres )

Year	Cultivae blareae including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	15,145,010	9,761,200	775,386	848,400
1931-32	14,579,561	6,528,200	814,049	595,800
1935-36	14,743,309	7,266,035	825,919	619,081

The cultivated area was considerably smaller in 1931-32 than in 1911-12. The double cropped area was also smaller in 1931-32 than in 1911-12. The figures for 1935-36, however, show an increase over the 1931-32 figures under both these heads.

1 O'Malley, Op. cit. p. 234.

2 Census Report, Bengal, 1901, p. 12.

\* Excluding figures for Orissa and Chota Nagpur States.

The following figures show the crop distribution in the Chota Nagpur Plateau.

TABLE—Crops (Census Reports)

Year	Percentage of gross cultivated area under			
	Rice	Maize	Other cereals and pulses	Other crops
1911	66.2	4.9	18.5	10.4
1921	60.7	5.1	23.1	11.1
1931	56.1	5.3	21.4	17.2

TABLE<sup>1</sup>—Crops (Agricultural Statistics)  
Acreage under

Year	Rice	Total food crops	Oil seeds
1911-12	6,351,700	9,441,100	783,600
1931-32	4,466,400	6,654,300	665,800
1935-36	4,608,917	6,613,862	581,158

Rice is the main crop. The area under rice was smaller in 1931-32 than in 1911-12. The total area under food crops was also smaller in 1931-32 than in 1911-12. The area under oil-seeds also shows a decline. Maize is an important crop of the *kharif* harvest in this region. This crop can be successfully grown over wide climatic ranges. It is a valuable crop as it matures early and ensures agricultural security. By supplying the cultivator with food it enables him to sell most of his *rabi* crops. "Its (Chota Nagpur's) agricultural resources are limited, and failures of the harvests occur periodically, but scarcity does not press hardly on the hardy aboriginal races, who can supply their needs from the forest and, even in the fat years, make considerable use of edible jungle products, such as the fruit of the *Mahua* tree."<sup>2</sup>

There is considerable culture of *lac* in the districts of Ranchi and Manbhumi.

1 Excluding figures for Orissa and Chota Nagpur States.

2 O'Malley, Op. cit. p. 18.

The mineral wealth of this tract is great. Here we find the richest coal-fields in India. Fine coal mines are found at Giridih, Jharia, and Daltonganj. Coal deposits are also to be met with in Sambalpur, though they are not so rich. Copper is found in Singhbhum. There are diamond mines in Sambalpur. Rich iron mines are located in Singhbhum and at Sakchi we have the Tata Iron and Steel works, the greatest and the largest of its kind in India. In Hazaribagh there are some of the richest mica-producing mines of the world. Manganese is found in Singhbhum and there are some deposits of tin and antimony in Hazaribagh. Stealite is found all over Chota Nagpur.

The following figures give the total yearly output and the total average number employed daily in some of these mines in Chota Nagpur. The figures are for the year 1939, the latest year for which such figures are available.<sup>1</sup>

	Total output during the year	Average daily employed
Coal	14,843,633 tons	121,790
Iron	1,543,934 tons	8,855
Manganese	35,803 tons	821
Chromite	4,476 tons	771
Copper	360,216 tons	3,085
Mica	69,690 cwt.	18,973
Stealite	955 tons	130

The following figures show the average daily employment in the large scale industrial establishments in the Chota Nagpur Plateau, in 1937.

	Perennial	Seasonal
I Textiles	...	...
II Engineering	9,047	...
III Minerals & Metals	24,784	...
IV Food, Drink & Tobacco	643	193
V Chemicals, Dyes, etc.	2,843	1,493
VI Paper & Printing	45	...
VII Processes relating to Wood, Stone and Glass	5,946	...
VIII Processes relating to Skins and Hides	...	...
IX Gins and Presses	...	...
X Miscellaneous	...	...

1 Report of the Chief Inspector of Mines, 1939.

This region is the home of numerous aboriginal tribes. There are Santals in Hazaribagh, Manbhum and Singhbhum, the Mundas in Ranchi, the Oraons in Ranchi and the Tributary States, the Hos in Singhbhum, and Gonds in the Tributary States.<sup>1</sup> The name *Kol* is commonly used to designate these aboriginal tribes. Most of them have kept their purity of race and retained their tribal languages and customs, but some, such as the Gonds and the Bhumij, have been largely Hinduized and have abandoned the language of their ancestors.

All of them are deeply attached to their land. "They cling to their ancestral fields with grim tenacity. It is therefore at first sight surprising that they should emigrate so freely. Assam contains a quarter of a million emigrants from the Chota Nagpur Plateau and Bengal nearly half a million (1917). The explanation is economic pressure. The land which they till is generally poor, and their methods of cultivation are primitive. New areas, it is true, are cleared and opened out, but they are prolific races and the extension of the area under tillage is incommensurate with the increase of population. The aborigines, moreover, do not care to cultivate more than is required for their immediate needs. Their readiness to emigrate has been the gain of other parts, more especially as they are free from the caste restriction of the Hindus and are not fastidious about their work. The tea gardens of Assam and the Duars have been opened out by them and are still largely dependent on their labour."<sup>2</sup>

The unstable agriculture of this region, as well as its topography, has much to do with its low density of population.

	1931	1921	1911	1901	1891	1881
Density per square mile...	217	186	186	163	153	134

The figures show a slow but a continuous increase, if the figure for 1921 is neglected. The population remained steady during 1911-21 and so too the density.

The following figures give the sex-ratio of the population.

Number of females per 1,000 males (Actual Population)	1931	1921	1911	1901	1891	1881
	1,006	1,014	1,019	1,022	1,012	999

<sup>1</sup> Imperial Gazetteer.

<sup>2</sup> L. S. S. O'Malley, Op. cit. 196.

The number of females shows a continuous decrease since 1901.

"On the Chota Nagpur Plateau the proportion of children is exceptionally high not so much because more of them are born as because fewer die. It is noticeable that in Ranchi, Singhbhum and Chota Nagpur States where the proportion of married women at the reproductive ages is smaller than anywhere else in the province, the average size of the family is largest. On the other hand, the low standard of comfort among the aboriginal tribes shortens the span of their life, and the number of persons aged 50 and over is consequently abnormally low."<sup>1</sup>

### Sind

(Area : 46,378 sq. miles. Actual Population in 1931 : 3,887,070; in 1941 : 4,535,000).

The newly-created province of Sind belongs to the lower valley of the Indus. It is flat and arid for the most part. A great deal of Sind is a flat desert displaying the extremes of climate. "On the verge of two monsoons Sind does not get the benefit of either".<sup>2</sup> "Thus the entire valley of the Indus from Attock to the sea lies in a region of deficient rainfall, the annual average being nowhere more than 10 inches".<sup>3</sup> In this region of deficient rainfall agriculture depends entirely on artificial irrigation, as in Egypt.

"In Sind the soils are solely alluvial. They vary in character from drift sand to light clays and are strongly impregnated with salt".<sup>4</sup> But the alluvial soil of the Sind plain is not so rich as that of the Ganges delta. "The plastic clay soil of Sind develops into a rich mould with water; without water it degenerates into a desert".<sup>5</sup>

Sind depends for its prosperity on the river Indus. Mother Indus has made Sind. The extent of cultivable area in Sind depends entirely on the irrigation of the Indus, rainfall being scanty and precarious. But the supplies in the Indus are varying. For nearly eight months of the year it is a comparatively small river and excepting some lands which depend on the old Fuleli Canals and the comparatively modern Sukkur and Jamrao Canals, no other land can, during the period of low supply, take advantage of its waters. In the remaining four months of

1 Census Report, Bihar and Orissa, 1931, p. 123. also cf. Dr. D. N. Majumdar, "Primitive Society and its Discomforts" The 2nd All-India Population Conference Report, 1938.

2 Gazetteer, Sind.

3 Dr. Ganguli "Agricultural Regions of India," in "Economic Problems of Modern India," p. 22.

4, Imperial Gazetteer. 5. Dr. Ganguli, Op. cit. p. 23,

the year the Indus flows under flood conditions but the extent and the time of occurrence of the floods depends on how fast and at what time the snows melt in the far away Himalayas, as it is the water from these snows which forms the main or the steady source of supply in the river. And as this supply depends on the snow conditions in the Himalayas, agriculture in Sind, in general, has contained a considerable element of uncertainty. The only practicable method of assuring a satisfactory level of water in the Indus at all seasons, was the provision of a "barrage" across the river. Such a barrage, has now been completed near Sukkur and has been in operation for the last six or seven years. This barrage is really a large regulator which can be so manipulated as to control the water level in the river.

The following figures show the general agricultural situation in Sind.

TABLE—Agricultural Statistics (Census Reports)

Year	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double Cropped	
1911	49	14	28	3	79
1921	52	16	29	3	76
1931	52	16	31	2	73

TABLE—Agricultural Statistics (in acres)

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	16,462,135	3,449,361	3,382,246	335,629
1931-32	15,189,193	3,852,943	3,195,619	462,713
1935-36	15,975,394	4,785,332	3,141,876	476,304

The figures bring out very clearly the almost complete dependence of Sind's agriculture on artificial irrigation. Both the area under cultivation and the double cropped area show increases during 1911-1931. In the latter table the figures for 1935-36 are post-barrage figures. Some information regarding the area commanded by the barrage is available.

Total area commanded by the barrage	... 7,406,158 acres.
Cultivable area	... 6,738,761 acres.
Final area of annual cultivation	... 5,300,000 acres.

This is a tremendous advance. The barrage must be regarded as a momentous economic experiment. Over extensive areas commanded by it the safety of crops has been assured to the same extent as in the canal irrigated plains of the Punjab. "For example, during the *kharif* season of 1934-35 while the inundation was unfavourable to agriculture and the deficiency of water supply was felt acutely in areas outside the command of the barrage, the *kharif* cultivation over the whole barrage area amounted to 98 p. c. of the average forecasted for the year."<sup>1</sup>

The following figures show the crop distribution in the region.

TABLE—Crops (Census Reports).

Year	Percentage of gross cultivated area under.							
	Rice	Jowar	Bajra	Other Cereals	Pulses	Other food crops	Cotton	Other Crops
*1911	25	...	...	49	10	...	6	10
1921	22	13	22	16	8	1	7	11
1931	22	14	24	11	11	1	2	15

TABLE—Crops (Agricultural Statistics)  
Acreage under

Year	Rice	Wheat	Millets	Total food Grains	Oilseeds	Cotton
1911-12	1,115,611	427,108	1,086,854	2,965,437	277,792	432,393
1931-32	1,182,963	469,117	1,430,595	3,635,808	233,419	256,342
1935-36	1,124,621	1,118,826	1,247,622	4,093,363	203,071	767,766

1. Dr. Ganguli, Op. cit., p. 24.

\* Figures for jowar, bajra and other food crops are not separately available,

The area under wheat in 1935-36 was more than twice of that in 1931-32. The area under millets and rice in 1935-36 was smaller than in 1931-32. The unfavourable natural environment has not allowed the farmers of Sind to grow valuable or heavy yielding crops to any great extent. The principal crops are rice, *jowar* and *bajra*, the area under these crops being until recently 60 p. c. of the net cultivated area. Rice and *bajra* were until recently, equally important crops, while *jowar* occupied a somewhat intermediate position. But this situation is being radically changed through the gradual development of the lands under the Lloyd Barrage. "There has been already an enormous increase in the area under heavy-yielding food crops and a valuable commercial crop like cotton."<sup>1</sup> This can be seen from the following figures :

Area under Cotton.	Whole of Sind.
Pre-barrage average.	280,000 acres.
Post barrage: ... in 1934-35.	676,000 acres.
1936-37.	893,878 acres.

Sind is very poor in minerals. Prospecting in recent years claims that it is a big potential oil-field. But nothing definite can be said about it just yet.

The following figures give the average daily employment in large industrial establishments in Sind, in 1937.

		Perennial	Seasonal
I	Textiles	449	...
II	Engineering	4,939	...
III	Minerals and Metals	66	...
IV	Food, Drink and Tobacco	1,182	1,388
V	Chemicals and Dyes etc.	1,362	...
VI	Paper and Printing	516	...
VII	Processes relating to Wood, Stone and Glass	305	...
VIII	Processes relating to Skins & Hides	26	...
IX	Gins and Presses	75	15,419
X	Miscellaneous	1,014	...

1 Dr. Ganguli, Op. cit.

The sex-ratio in the population of Sind is rather remarkable. The deficiency and the decline of females is particularly acute here. The following figures give the number of females per 1000 males in actual population in Sind.

Number of females per 1000 males in <sup>1</sup> Sind (Actual Population)	1931	1921	1911	1901	1891	1881
	782	785	811	822	831	833

The following figures give the density of population in Sind.

	1931	1921	1911	1901	1891	1881
Density per square mile.	84	71	75	68	61	51

All the districts of Sind are inclined to be "accessive"<sup>2</sup>. This characteristic would be further accentuated at this ( 1941 ) census. The completion of the barrage has attracted a large number of migrants to Sind. The quantitative effect of this, however, cannot be assessed till the figures of the 1941 Census become available.

### The North-West Dry Area (Punjab).

( Area: 56,236 sq. miles. Actual Population in 1931: 7,290,916. )

The North-West Dry Area (Punjab) is a group of districts and states lying far away from the Himalayan Range in the western half of the Province. It can be properly described as the south-western plain of the Punjab. This region comprises eight districts and the State of Bahawalpur. Most of these lie between the rivers Indus and Sutlej. Only the district of Dera Ghazi Khan lies beyond the Indus. This region really deserves the name Punjab, the land of five rivers ; to wit, Indus, Jhelum, Chenab, Ravi and Sutlej. It is a flat plain. The low hills, found in some of these districts, are waterless and bare.

1 The figures in this table are calculated from the proportion of males and females per mille of total population in Sind. This practice has been followed also in the case of Gujarat, Konkan and the Bombay Deccan. This had to be done as the figures for the sex-ratios of the populations of all these regions were given in a form not comparable with other regions under consideration in this publication.

2. Census Report, Bombay, 1931, p. 87.

It is a very dry region. Its climate can be best described as "hot winds and blazing suns". The south-west monsoon winds from the Sind and Kathiawar coasts encircle this region but do not enter it, so that it gets very little rain from that source. The region in consequence gets an 'extremely light and variable rainfall' averaging from 5 inches to 13 inches annually.<sup>1</sup> "So valuable indeed is water", remarks Mr. (now Sir M.) Darling, "that property in it arose before property in land."<sup>2</sup>

In this region agriculture depends entirely on artificial irrigation from canals. Before the construction of canals this region was nothing short of a desert, inhabited sparsely by wandering nomads. The evolution of a well-co-ordinated system of canals has revolutionized agriculture there. The scheme of Nature has been altered out of all recognition by the hand of Man. "God has said," so runs one of 'Akbar's Sanads', "from water all things are made. I consequently ordain that this jungle, in which subsistence is obtained with thirst, be converted into a place of comfort." Strangely it fell to the British administration's lot to execute the *fatwah* of the Great Moghul by constructing the huge canal systems in this region.

The colonization of vast areas of state lands has been an important feature of the canal schemes in this part of the Punjab. There are in all six canal colonies the most important of which are three viz. Chenab Colony (Lyallpur district) 1892, Jhelum Colony (Shahapur district) 1897, Lower Bari Doab Colony (Montgomery district) 1905-1917. "When the Lower Chenab canal was started the population of the vast Bar tract which it commands consisted of a few nomad cattle owners and cattle thieves. Large bodies of colonists were brought from the crowded districts of Central Punjab. The allotments to peasants usually consisted of 55 acres. There were larger allotments known as yeomen and capitalists grants, but the peasants are the only class who have turned out quite satisfactory farmers. Colonization was begun in 1892 and was practically complete by 1904 when over 1,800,000 acres had been allotted. To save the peasants from the evils of unrestricted rights of transfer, it was decided to give the peasants permanent inalienable tenant rights. The Punjab Alienation of Land Act No. XIII of 1900 has supplied a remedy generally applicable, and the peasant grantees are now being allowed to acquire ownership on very

<sup>1</sup> Dr. Ganguli, "The Agricultural Regions of India" in "Economic Problems of Modern India", 1939, p. 19.

<sup>2</sup> Punjab Peasant in Prosperity and Debt, M. L. Darling, 1925, p. 106.

easy terms."<sup>1</sup> In this region canal irrigation protects both the *kharif* and the *rabi* harvests. "The farmers prefer flow to lift irrigation because they get more water by flow irrigation, while lift irrigation demands a considerable amount of both man power and animal power. For the same reason flow irrigation has superseded well irrigation to a considerable extent. Indeed, irrigation from perennial canals has always been preferred wherever the spring-level is not less than twenty feet below the surface. But where it is higher wells have been constructed as protective irrigation works. They are not used during the summer months, the areas which they serve being in these months as far as possible irrigated by canal water or submerged by river floods, and the cattle used for well irrigation are thus available for ploughing during this period. The land which is cultivated for the *rabi* harvest is, during the latter part of summer, soaked as much as possible with water from canals or floods. As a rule, however, the winter crops require further irrigation especially when owing to short supplies in the rivers, the canals cannot carry sufficient water to ripen the *rabi* crops unaided. Hence it becomes the principal function of wells to supply the valuable winter crops, like unmixed wheat, the further irrigation which they need. Thus both well irrigation and canal irrigation have been ingeniously combined into a co-ordinated system of artificial irrigation. Such a system of canals and wells supplementing one another is seen to best advantage in the Jhelum Valley, in the district of Shahpur."<sup>2</sup>

The general agricultural situation in this region can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports)

Year	Percentage of Total Area		Percentage of culti-vable area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	59	20	34	3	73
1921	64	24	67	4	77
1931	84	34	40	4	71

1 Punjab, N. W. F. P. and Kashmir, Sir James Dorie, Provincial Geography Series, Cambridge, p. 139-40.

2 Dr. Ganguli, Op. cit. p. 21.

TABLE—Agricultural Statistics (in acres)

Year	Cultivable area including fallow	Cultivated area	Irrigated-area	Area cropped more than once
1911-12	19,364,580	6,583,000	5,711,992	746,978
1931-32	24,190,915	8,326,798	7,823,635	904,065
1935-36	24,101,247	10,186,232	8,444,796	893,536

The area under cultivation in 1935-36 was larger than that in 1911-12 or that in 1931-32. Similar is the case with the irrigated area. Agriculture in this region is almost wholly dependent on artificial irrigation. The figures bring this out very well. The double cropped area in 1935-36 was, however, slightly less than that in 1931-32.

Canal cultivation which is the principal type of cultivation in this region, is much less intensive and careful than cultivation on well-irrigated land. Only a sensitive crop like maize is the chief crop cultivated on well-irrigated land here. On canal-irrigated lands "there is less adherence to rotation, more double-cropping, less manuring, and on the whole, less careful and more varied cultivation. Such an extensive type of cultivation is on a broad and lavish scale. Rice, maize and cotton are grown on the basis of extensive farming and are followed by second crops of gram, fodder and fodder grasses."<sup>1</sup> Well irrigation in this region is confined mainly to the *rabi* harvest and has mostly a protective function.

The following figures show the distribution of crops in this region.

TABLE—Crops (Census Reports)

Percentage of gross cultivated area under				
Year.	Wheat	Rice	Other cereals and pulses	Other Crops
1911	40.6	3.8	12.3	43.3
1921	38.0	3.8	8.2	50.0
1931	36.0	3.0	30.0	31.0

1 Dr. Ganguli, Op. cit. p. 22.

TABLE—Crops (Agricultural Statistics ).

## Acreage under

Year	Rice	Wheat	Millets	Total Food Grains	Oil Seeds	Cotton
1911-12	299,583	3,040,640	472,988	4,951,710	486,924	664,546
1931-32	186,306	3,631,732	698,707	6,783,265	643,905	914,097
1935-36	172,428	3,745,396	472,587	6,569,923	414,204	1,855,817

Wheat is the principal crop of the region. The area under wheat in 1935-36 was larger than that in 1931-32 or that in 1911-12. "The most important crop grown extensively is unmixed wheat, which is more sensitive to drought than mixed wheat. The canals provide for enormous areas under this crop water which wells alone could not supply. Thus owing to the development of canal irrigation in this region, valuable crops like cotton, oilseeds and gram have increased in importance at the cost of the cheap millets and pulses, while cultivation of wheat has increased on a scale scarcely imagined before."<sup>1</sup> The most significant development, however, seems to be the development of the cotton crop. The figures bring out its growing importance in the agricultural economy of this region.

The mineral resources of this region are fairly rich. Rock salt occurs in Shahpur and Mianwali Districts in large quantities. In 1939, in these two districts, 42,877 tons of salt were worked out. There are some deposits of coal in the former district. The coal mines at Bhaganwala were abandoned in 1900, due to the poor quality of the coal, though work on a small scale goes on there. Small outcrop workings still go on, on the southern scrap of the Salt Range at Tejuwala, in Shahpur. Alum is manufactured from the pyritous slates of the Mianwali District. Similar slates containing pyrites are known to occur in other parts of this area. In association with rock salt gypsum occurs in large quantities. In this area there are also beds of potash and magnesium salts, though their value and quantity is not known.

1 Dr. Ganguli. Op. cit., p. 22.

The following figures show the average daily employment in large Industrial Establishments in the North-West Dry Area, Punjab, in 1937.

		Perennial	Seasonal
I. Textiles	...	3,449	...
II. Engineering	...	337	...
III. Minerals and Metals	...	79	...
IV. Food, Drink and Tobacco	...	583	66
V. Chemicals, Dyes, etc.	...	221	...
VI. Paper and Printing	...	...	...
VII. Processes relating to Stone, Wood and Glass	...	...	...
VIII. Processes relating to Skins and Hides	...	...	...
IX. Gins and Presses	...	...	16,235
X. Miscellaneous	...	147	69

The following figures show the density of the population.

	1931	1921	1911	1901	1891	1881
Density per square mile ...	125	103	94	80	66	58

The figures show a continuous increase over a period of fifty years.

This region receives considerably more immigrants than the emigrants it sends out. The canal colonies in this region have attracted people from other places, since their inauguration in 1892. This inflow of immigrants provides a unique example of agricultural migration. Most of the immigrants to this region have come from the crowded districts of the Sub-Himalayan Punjab. The migrations are of the permanent kind. The Census Superintendent of Punjab in 1921, remarked that the statistics show that a canal colony passes through five stages. In the first stage, before irriga-

tion, the region has a small nomadic population. In the second stage, after irrigation is complete, there is an influx of immigrants, government grantees and persons seeking employment, as tenants and artisans. In the third stage, when pioneer work is complete and when keen demand for service is lowered, large numbers return home or move to other fresh colonies. These people are generally those who have come to the colony, not because of pressure at home but because of their attachment to the grantees coming from less populous districts. In the fourth stage, the population settles down, immigration diminishes continually and the old pioneers are slowly replaced by their children. In the final stage, the colony is inhabited by persons born in its own boundaries and ceases to be a colony.<sup>1</sup>

"The effect of immigration into the North-West Dry Area is reflected in the larger percentage of increase in the population aged between 15 and 40 which is usually the most active period of life".<sup>2</sup>

The following figures give the proportion of males and females in the population.

Number of females per 1000 males (Actual Popu- lation.)	1931	1921	1911	1901	1891	1881
	831	827	825	838	847	841

#### Madras East Coast, North.

(Area : 31,532 sq. miles. Actual Population in 1931 : 12,175,530)

This region consists of a lowlying strip, stretching from the line of the sea to the foot of the Eastern Ghats on the Coromandel Coast. It consists of eight districts, the southern-most being Nellore. Four of the districts, namely the two Godavari districts and Kistna and Guntur are the very heart of Andhradesh.

Unlike the west coast strip, this strip of land has several large rivers flowing across it. It contains the fertile deltas of Godavari and Kistna, the two most important rivers of southern India. The soil is predominantly alluvial and the land is level and not rocky. "Land is valuable and as a consequence locomotion is difficult, for on the embanked roads, at cultivation time, every form of human activity takes place."<sup>3</sup>

1 Census Report, Punjab, 1921, p. 83.

2 Census Report, Punjab, 1931, p. 68.

3 Census Report, Madras, 1931, p. 23.

This region receives on an average a rainfall varying from 30 to 40 inches annually. Both the monsoons contribute their quota but there are no spring rains. "The district of Nellore, from a climatic point of view, falls into a no-man's land which receives an uncertain supply from both monsoons and although it is at a low elevation and on the opposite side of the Eastern Ghats, it has much in common with its Deccan neighbours on the west."<sup>1</sup>

In the coastal plains soil is also a determining factor of agricultural productivity and security. The ferruginous red soils are found to a greater extent in the eastern coastal plain, particularly in the densely populated deltas. These soils require continual watering, and the yield of crop depends upon an efficient system of artificial irrigation.<sup>2</sup>

The irrigation system of the deltas is much more modern than that of Tanjore and allows navigation in the main canals. The following figures show the percentage borne by the actually irrigated area to the area commanded by the two great irrigation systems of Godavari and Kistna.

Godavari delta : 82 per cent.

Kistna delta : 82 per cent.

They show that there is a theoretical margin of extension (of irrigation) available in the Godavari and Kistna systems. This is mainly in West Godavari and Kistna districts as also in East Godavari and Guntur districts. The areas to which irrigation can be extended are roughly.<sup>3</sup>

East Godavari	19,253 acres.
West Godavari	150,500 acres.
Kistna	97,700 acres.
Guntur	27,000 acres.

The general agricultural situation in this region can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports)

Year	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivated area Irrigated.
	Cultivable	Cultivated	Cultivated	Double Cropped	
1911	62.8	41.4	65.9	12.7	37.3
1921	63.4	40.8	64.3	13.1	43.3
1931	68.0	42.7	62.8	12.5	40.0

1. Census Report, Madras, 1931, p. 24.

2. Dr. Ganguli "Agricultural Regions of India", in "Economic Problems of Modern India", 1939, p. 26.

3. Census Report, Madras, 1931, p. 24-25.

TABLE—Agricultural Statistics ( in acres )

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	17,560,817	10,108,870	4,371,935	1,737,922
1931-32	18,860,940	10,332,801	4,096,528	2,000,530
1935-36	17,985,596	9,998,466	3,601,879	1,962,271

The figures for 1935-36 in the latter table are not comparable with other figures in that table, as Ganjam District was transferred to the newly created Orissa Province in that year. In those figures again the figures for the Vizagapatam district are for the year 1934. The figures for the cultivated and the double-cropped area in 1931-32 showed an increase over the figures for 1911-12, but the irrigated area in 1931-32 was slightly less than that in 1911-12.

The following figures give the distribution of crops in this region.

TABLE—Crops ( Census Report )

Percentage of gross cultivated area under

Year	Rice	Millets	Other food crops and pulses	Ground-nut	Cotton	Other crops
1911	37.2	26.5	17.6	0.1	3.1	15.5
1921	38.4	21.2	17.6	0.5	2.9	19.4
1931	39.1	23.8	20.7	2.4	2.3	11.7

TABLE—Crops (Agricultural Statistics)

## Acreage under.

Year	Rice	Millets	Total food grains	Oil seeds	Tobacco
1911-12	4,589,060	2,091,671	9,512,409	666,985	120,464
1931-32	4,891,785	1,963,263	9,815,996	1,070,546	183,091
1935-36	4,510,508	1,896,378	9,035,933	1,034,088	222,963

The main crop is, of course, rice. The area under rice in 1931-32 was larger than that in 1911-12. "The agricultural productivity of the rice region has depended on the development of canal irrigation. Here the yield of irrigated rice is 1,000 lbs. to 1,500 lbs. per acre as compared to 400 lbs. to 800 lbs. in the case of unirrigated rice, and there is a corresponding difference between the density of population in the canal irrigated tracts and that in the unirrigated tracts of the river deltas."<sup>1</sup> The most significant development is the increase in the area under oil seeds, mostly ground-nuts. In 1931-32 the area under oil seeds was far greater than that in 1911-12. There is another commercial crop in this region which is growing in importance of late. It is tobacco. The Madras presidency possesses 9.5 per cent. of the total all-India acreage under tobacco.<sup>2</sup> Most of this acreage is concentrated in the Guntur district. The acreage under tobacco in this district amounted to 134,000 in 1935-36. Sugarcane is grown in both the Godavari districts. The crop distribution of this region is a balanced one, with rice, a heavy yielding food crop as the basis and four important commercial crops, cotton, groundnuts, tobacco and sugarcane.

Mica is found in the Nellore district. This district, during 1939, produced 22,429 cwt. of mica and the average daily employment in these mines was 6,558. There are also traces of copper in the same district. In the Godavari district graphite is met with. Manganese ore is available in Vizagapatam. In Nellore samarskite, which contains radium, is also found.<sup>3</sup>

1 Dr. Ganguli, Op. cit. p. 27.

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2 Report on the Marketing of Tobacco in India, 1939, p. 8.

3 Madras; Provincial Geography Series, Cambridge, 1914.

The following figures show the average daily employment in large Industrial Establishments in the East Coast Madras, North, in 1937.

		Perennial	Seasonal
I	Textiles.	880	...
II	Engineering.	1,214	...
III	Minerals and Metals.	95	...
IV	Food, Drink and Tobacco.	14,925	1,942
V	Chemicals, Dyes, etc.	144	...
VI	Paper and Printing.	305	...
VII	Processes relating to Wood, Glass and Stone.	159	...
VIII	Processes relating to Skins and Hides.	...	...
IX	Gins and Presses.	1,017	2,324
X	Miscellaneous.	...	...

The following figures give the density of population.

	1931	1921	1911	1901	1891
Density per square mile. ...	386	344	333	303	279

The figures show a continuous and a fairly rapid increase.

The migratory movements of the people of this region are assuming greater importance at every succeeding census. As the Census Superintendent of Madras for 1931 remarked, "In the case of the two northern coastal districts, a strong emigration current has entered prominently into their scheme of existence.<sup>1</sup> " The two main regions which attract emigrants from this region are Assam and Burma. The two streams of emigrants, however, differ largely in their composition. The tea garden element has drawn on many parts of the presidency but has particularly favoured the Northern

1 Census Report, Madras, 1931, p. 46.

Circars. Assam gets practically the whole of its Madrasi element from the three districts of Ganjam, Vizagapatam and Godavari, whence, in 1921, went out 48,119 out of the total of 54,536 emigrants to Assam.<sup>1</sup> "In 1931, 59,448 Madrasis were enumerated in Assam, with a sex ratio of 852 females per 1,000 males. It is more like a settlement than ordinary male migration in search of work".<sup>2</sup>

"The Burmese emigration is largely a Circars phenomenon. Burmese development has had a profound influence on the Telugu coastal districts and the presence of 300,000 Madrasis in Burma at the time of the census is an indication of the importance of the movement. Whereas in Assam the Madrasi is as it were specialized, he fulfils in Burma a wide variety of functions. He tills the paddy fields.<sup>3</sup> He mans the railways. He handles cargoes at Rangoon. He functions largely in domestic service; clerical employment claims him and there is nothing to which he cannot put his hand with acceptance"<sup>4</sup> The following figures give the classification of total emigrants to Burma in 1931, on the assumption that the proportions for districts were the same as in 1921.

Ganjam.	85,000	Vizagapatam.	63,000
Godavari.	44,000	Kistna	15,000

The following figures show the proportion of the sexes in the population of this region.

	1931	1921	1911	1901	1891
The number of females per 1000 males ( Actual population)	1,039	1,051	1,043	1,031	1,018

The proportion of females increased continuously from 1891 to 1921. It has registered a decline between 1921-31.

In this region there is a higher juvenile element than in the south of the Presidency. The proportion of old people is also smaller in this region as compared with the south.<sup>4</sup>

1 Census Report, Madras, 1921, p. 50.

2 Census Report, Madras, 1931, p. 81.

3 Census Report, Madras, 1931, p. 82.

4 Census Report, Madras, 1931, p. 111.

### Brahmaputra Valley.

(Area : 27,692 sq. miles. Actual Population in 1931 : 4,723,293; in 1941 : 5,695,669.)

Brahmaputra or the Assam Valley lies in the north-east corner of India. "It is an alluvial plain about 450 miles in length with average breadth of 50 miles, shut in by hills on every side except the west."<sup>1</sup> The whole province of Assam faces the rain-bearing winds from the Bay of Bengal and receives a very heavy rainfall. Brahmaputra Valley receives on an average 95 to 100 inches of rain annually. Over most of the country rain falls for eight months of the year. The province of Assam is the wettest in India.

"Silt is deposited in Brahmaputra Valley in slack water away from the main current of the river and the soil of that division consists of a mixture of clay and sand in varying proportions, which ranges from pure sand to clay, so stiff as to be hardly fit for cultivation."<sup>2</sup>

The heavy rainfall and the seasonal river floods solve the problem of agricultural water supply in this region. But the factor that assumes importance is the elevation of land. The riverain tract, which is covered with grass and marshy places, is liable to heavy floods and so becomes unfit for secure cultivation. The sub-montane tract is out of the reach of the floods and with its rapid drainage, is mostly dependent for its agriculture on artificial irrigation. Between these two is the broad belt of land above the reach of ordinary floods and receiving heavy rainfall together with moderate spill irrigation. As compared with Surma Valley, Brahmaputra Valley suffers from some natural disadvantages. In Brahmaputra Valley the soil is not renewed with silt every year by floods as the current of the river is very swift and it deposits only the heavier portion of the matter held in suspension e. g. sand. "Hence in this region the crops depend more upon the agricultural water supply than upon the intrinsic fertility of the soil."<sup>3</sup>

1 Imperial Gazetteer.

2 Imperial Gazetteer.

3 Dr. Ganguli, "Agricultural Regions of India," in "Economic Problems of Modern India," 1939, p. 8.

The general agricultural situation in the Bramhaputra Valley can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports)

Year	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	78.0	15.0	19.0	2.3	3.4
1921	70.6	16.0	23.0	3.0	5.8
1931	...	19.0	...	...	...

TABLE—Agricultural Statistics (in acres).

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
*1911-12	11,744,925	2,466,367	281,261	251,704
1931-32	13,294,545	2,412,874	349,127	330,092
1935-36	11,999,249	3,756,186	349,347	542,658

The area under cultivation in 1931-32 was slightly smaller than that in 1911-12. The figures for cultivated area in the former table give a false impression of an increase in the cultivated area. Irrigated area in 1935-36 was larger than the irrigated area in 1911-12. The double cropped area in this region is only a small percentage of the total cultivated area. Double cropping in this region is practised only on the best soils and lands of suitable elevation. There are no Government canals in Assam. What little artificial irrigation there is, is carried on with the help of old canals, constructed by the Kachari and Mech people, at the foot of the Himalayas. The development of canal irrigation has no scope in this region, firstly because it will be more or less superfluous and secondly because of its impossibility. For no engineer can harness the mighty river Bramhaputra for irrigation

\* Sadia and Balipara Frontier Tracts excluded.

purposes and the configuration of the country makes the construction of canals a very difficult, if not an impossible task.

The following figures show the distribution of crops in this region.

TABLE—Crops (Census Statistics).

Year	Percentage of gross cultivated area under					
	Rice	Other food grains	Oil seeds	Jute	Tea	Other crops
1911	67.0	4.0	8.0	2.0	8.0	11.0
1921	67.4	3.1	8.5	2.2	7.9	10.9
1931	64.4	3.5	8.9	4.2	7.3	11.6

TABLE—Crops (Agricultural Statistics).

Year	Acreage under				
	Rice	Total food grains	Oil seeds	Jute	Tea
*1911-12	1,872,845	1,956,378	220,095	48,245	218,178
1931-32	2,460,319	2,616,275	269,005	72,972	291,709
1935-36	2,932,552	3,074,060	458,307	103,175	293,407

Rice is the principal crop. *Aus* and *Aman* paddy yield bumper crops with little effort. The area under rice shows a large increase. The three other crops of importance are all commercial crops. The area under jute has increased considerably between 1931-32 and 1935-36. Tea is also extensively grown. The damp and well-drained soil and the frequent rain of this region admirably suit its cultivation.

In the Brahmaputra Valley there are some valuable deposits of coal and petroleum. Coal seams occur in Lakhimpur and Shibsagar districts. In the Lakhimpur district the output of coal

\* Sadia and Balipara Frontier Tracts excluded.

during 1939 was 238,102 tons. Petroleum wells are located at Digboi in the Lakhimpur district<sup>1</sup>.

The following figures give the average daily employment in the large Industrial Establishments in the Bramhaputra Valley, in 1937.

		Perennial	Seasonal
I	Textiles.	...	...
II	Engineering.	1,620	...
III	Minerals and Metals.	2,005	...
IV	Food, Drink and Tobacco.	529	28,633
V	Chemicals, Dyes, etc.	745	...
VI	Paper and Printing.	152	...
VII	Processes relating to Stone, Wood and Glass.	703	...
VIII	Processes relating to Skins and Hides.	...	...
IX	Gins and Presses.	...	555
X	Miscellaneous.	...	...

The following figures give the density of population in this region.

	1941	1931	1921	1911
Density per square mile	206	171	141	114

The density figures show a continuous increase.

This region attracts a large number of immigrants. Its tea gardens attract labourers from afar. The main provinces that

1 Imperial Gazetteer.

contribute to this flow are Bihar, Orissa, Bengal, United Provinces and Madras. The climate of Assam as a whole is not very healthy and the land is known to be malaria-ridden. The labourers are therefore induced by attractive baits to come to the tea gardens. There are recruitment agents who travel in, (what the above-mentioned Provinces are generally called) the "recruiting provinces" and labourers are recruited by them and sent to Assam, at the expense of the employers. The population censused on the tea gardens in this region was 615,000 in 1921 and 651,000 in 1931.

There has been another kind of influx in the Bramhaputra Valley, the influx of colonists from East Bengal and especially of colonists from the Mymensingh district. "The complexion" writes Professor Hodson "of the population of Assam has been altered by the permanent immigrants from Mymensingh in Bengal. Where there is waste land thither flock the Mymensinghites. In fact, the way in which they have seized upon the vacant areas in Assam Valley seems almost uncanny. Without fuss, without tumult, without undue trouble to the revenue staff, a population which must amount to over half a million, has transplanted itself from Bengal to Assam Valley, during the last twenty-five years."<sup>1</sup> The quantitative aspects of this influx can be studied from the following figures.

Table showing the number of persons, born in Bengal, but found in each district of Bramhaputra Valley in 1911, 1921, 1931 and the actual population of those districts in those years. ('000 omitted)

	Golpara	Kamrup	Darrang	Nowrangpur	Sibsagar	Lakhimpur
1911 Actual Population	77 (600)	4 (668)	7 (375)	4 (301)	14 (691)	14 (449)
1921 Actual Population	151 (672)	44 (763)	20 (477)	58 (389)	14 (823)	14 (586)
1931 Actual Population	170 (882)	134 (976)	41 (584)	120 (562)	12 (933)	19 (724)

<sup>1</sup> India : Census Ethnography, 1901-1931, Prof. Hodson, p. 8.

The following figures give the proportion of females to males.

	1931	1921	1911	1901
Number of females per 1,000 males. ( Actual Population )	869	892	913	924

The number of females shows a decrease from 1901.

The effect of immigration is seen in the age statistics. "In the Brahmaputra Valley except between 5-15 the proportion of the sexes in the different age-periods is very dissimilar."<sup>1</sup>

#### East Coast, Madras, South.

(Area : 23,280 sq. miles. Actual Population in 1931 : 10,774,702 ; in 1941 : 11,511,800 ).

Madras East Coast, South, is again a region situated in the eastern coastal strip of the Indian Peninsula, though its breadth forbids its description as a strip. It includes the southern districts of Tanjore, Trichinopoly, Madura, Ramnad and Tinnevelly. The State of Pudukkottai also comes within its boundaries. It is pre-eminently the land of the Tamils. These "southern Tamil districts are really the heart of Tamil Nadu and one of the most advanced and sophisticated regions of the presidency. Education is more diffused, literacy is higher, larger proportion enters the professions and services and a large element of the populace lives in towns."<sup>2</sup>

This region, being in the extreme south of the Indian Peninsula, gets rain from both the monsoon currents, the south-west and the north-east. But though "the longer rainy season extends the length of the agricultural year as on the Malabar coast, yet both agricultural productivity and agricultural security are much less in South Madras. The reason is that the latter gets little or no benefit from the south-west monsoon and is too far south to get much benefit from the north-east monsoon."<sup>3</sup>

The main rivers that flow across this region are the Kauveri and the Tamraparni. The region gets on an average a rainfall of

1 Census Report, Assam, 1931, p. 60.

2 Census Report, Madras, 1931, p. 38.

3 Dr. Ganguli, "Agricultural Regions of India" in "Economic Problems of Modern India", 1939, p. 25.

30 to 35 inches annually. The ferruginous red soils of the region of the eastern coast require continual watering. In view of the smallness of rainfall the need for artificial irrigation is more imperative in the eastern coastal regions. "Here a splendid system of canal irrigation has been evolved by developing and controlling the deltaic rivers, and agriculture is completely dominated by Canal irrigation. (The percentage of irrigated area is as high as 73% in the Tanjore delta). But in the arid tracts of South Madras food crops are grown largely on "wet" land with water from artificial reservoirs which should be filled by rainfall from the north-east monsoon, and thus a failure of this monsoon current is disastrous in its effect on crops."<sup>1</sup>

The general agricultural situation in the region can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports)

Year	Percentage of Total area		Percentage of cultivable area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	72.9	52.1	71.4	7.4	32.7
1921	73.4	22.1	70.9	7.0	36.2
1931	72.6	47.1	64.8	7.0	41.1

TABLE—Agricultural Statistics (in acres)

Year	Cultivated area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	9,331,229	6,635,074	2,416,096	748,993
1931-32	10,847,180	6,509,867	2,405,861	709,949
1935-36	10,976,436	6,502,103	2,425,048	770,600

1 Ibid. p. 26.

The cultivated area in 1931-32 was smaller than the cultivated area in 1911-12. It was still smaller in 1935-36. The area that was cropped more than once in 1931 was smaller than that in 1911-12. The irrigated area did not show large variations. Agriculture in this region is largely a function of artificial irrigation. What are the prospects of its further development? The irrigation possibilities of the Kauveri delta are practically exhausted. In the districts of Trichinopoly and Tanjore there is very little scope for the development of irrigation.<sup>1</sup> The Mettur project on the Kauveri river has just been completed. This is the most massive dam ever constructed and will hold up a lake capable of storing 80,000 million cubic feet of water. This will be used to supplement the fluctuating supplies of the old Kauveri systems and for an area 300,000 acres new irrigation.<sup>2</sup> Barring these new developments "one portion of this region has reached saturation. This might be defined as an ellipse of moderate eccentricity with foci in central Pudukottai and Musuri."<sup>3</sup>

The following figures show the distribution of crops in this region.

TABLE—Crops ( Census Reports )

Year	Percentage of gross cultivated area under					
	Rice	Millets	Other food crops and pulses	Ground-nut	Cotton	Other crops
1911	29.5	30.0	18.3	2.9	9.9	9.4
1921	31.5	27.7	18.4	3.6	9.4	9.4
1931	33.8	24.8	20.4	4.5	10.1	6.4

TABLE—Crops ( Agricultural Statistics )

Year	Acreage under				
	Rice	Millets	Total food grains	Oil seeds	Cotton
1911-12	2,132,890	1,731,390	5,535,931	530,862	832,684
1931-32	2,450,728	1,362,635	5,274,424	516,249	647,763
1935-36	2,503,062	1,422,079	5,312,388	570,088	833,096

1 Census Report, Madras, 1931, p. 24, 25.

2 Sir Bernard Darley, "Irrigation and its Possibilities," in "Economic Problems of Modern India", 1939, p. 164.

3 Census Report, Madras, 1931, p. 45.

Rice is the main crop. The area under rice in 1931-32 was larger than that in 1911-12. It had increased still further in 1935-36. The area under cotton in 1931-32 was much smaller than that in 1911-12. But in 1935-36 cotton occupied a slightly larger area than that in 1911-12. The same is the case with oil seeds, ( mostly ground-nuts ). Trichinopoly, Madura, Tinnevelly are the cotton-growing areas of the rice zone where low rainfall combines with black cotton soil. Trichinopoly and Madura also grow tobacco. "These are prosperous areas having a sound economic basis of two food crops, rice and jowar, the latter also yielding good cattle fodder in addition. Moreover cotton is here grown as a very profitable crop which does not compete with rice".<sup>1</sup>

This region is poor in mineral wealth. Except for the occurrence of graphite and plumbago or black lead in Tinnevelly no other mineral deposits are known to exist in this region.

The following figures give the average daily employment in the large industrial establishments in East Coast Madras, South in 1937.

		Perennial	Seasonal
I	Textiles	31,250	...
II	Engineering	5,125	...
III	Minerals and Metals	366	...
IV	Food, Drink and Tobacco	4,657	1,139
V	Chemicals, Dyes, etc.	2,214	...
VI	Paper and Printing	320	...
VII	Processes relating to Wood, Stone and Glass	98	...
VIII	Processes relating to Skins and Hides	297	...
IX	Gins and Presses	750	4,985
X	Miscellaneous	31	...

1 Dr. Ganguli, Op. cit., p. 27.

The following figures give the density of population in this region.

	1931	1921	1911	1901	1891
Density per square mile...	463	442	429	396	375

With regard to migration in this region, "it is interesting to observe that emigration is heavy from the districts of less irrigation possibilities as, for example, Trichinopoly and Ramnad."<sup>1</sup> This region has very old migratory traditions. There are three main streams of emigration from this region. First comes the temporary emigration of its people to the tea and rubber plantations, in Coimbatore and the Nilgiris, the second is that to Burma and Ceylon, and the third to Malaya. The main recruiting areas in this region for the Coimbatore plantations are the western taluks of Trichinopoly, the northern taluks of Madura, Tinnevelly and western Ramnad. Tinnevelly itself furnishes half the labour in Travancore and with Madura and Ramnad, over three-fourths.

"In general labour on those estates bears a marked resemblance to more sedentary forms of activity in which the twelve months include a definite period of holiday, generally of two months."<sup>2</sup> The labour comes by families and returns year after year frequently to the same estate. The labour thus becomes a familiar body in its recruiting areas. This familiarity is indicated by the name "Upasipuram" ( Upasi meaning the United Planters Association of Southern India ) given to a new village in Tinnevelly, built largely by ex-labourers on estates. Practically all the labour is drawn from the depressed classes, and a small percentage from the criminal tribes. The general system of recruitment is through Kangani or licensed recruiters.<sup>3</sup>

Next comes the emigration to Burma and Ceylon. The following figures give the actual number of emigrants to Burma in 1931, on the assumption that the district proportions were then the same as those of 1921.<sup>4</sup>

Tinnevelly	Ramnad	23,000
Malabar ( not in this region )	Tanjore	25,000
	Madura	11,000

<sup>1</sup> Census Report, Madras, 1931, p. 25.

<sup>2</sup> Census Report, Madras, 1921 p. 81. One, however, wonders as to how labour on plantation can be said to resemble sedentary forms of activity !

<sup>3</sup> Census Report, Madras, 1931, p. 81.

<sup>4</sup> Census Report, Madras, 1931, p. 82.

The emigration of Madrasis beyond British India has taken a wide range, but in two directions its importance far outweighs that in any other. These are towards Malaya and Ceylon. The two differ widely. Malaya emigration is still essentially a male phenomenon, whereas Ceylon has been taken as it were into Tamil heart. Ceylon is no more foreign to the Trichinopoly labourer than Madura or Ramnad. Tamil emigration to Ceylon is no new phenomenon but goes back a century and more. In 1837 the number of emigrant Tamil labourers employed in Ceylon coffee estates was estimated at 10,000.<sup>1</sup>

Emigration to Malaya is predominantly a hot weather feature, the movement being at its greatest in April and June. The sea-ports are Madras and Negapatam.<sup>2</sup>

The following figures give in a combined form the emigration from this region to Ceylon, Malaya, Burma and Upasi (The United Planters Association of Southern India).

	Putative contribution in 1931 to Indians in				Four- fifths 1930 actual	P. C. of total to 1921 popula- tion
	Ceylon	Malaya	Burma	Upasi		
Tanjore	84,667	60,651	24,994	95	170,400	7
Trichinopoly	266,704	81,859	...	4,890	353,450	19
Pudukottai	53,769	1,806	...	70	56,650	13
Ramnad	72,163	17,828	22,911	6,747	119,650	7
Tinnevelly	79,435	10,895	7,736	33,087	130,880	7

The majority of the Indians enumerated in Malaya are from the south. Tamils contribute 908 persons per every 1000 Indians in Malaya. The following age group figures illustrate the nature of this emigration.

<sup>1</sup> Census Report, Madras, 1931, p. 83. Cf. Justice Ranade, "Indian Foreign Emigration" in "Essays on Indian Economics", 1898.

<sup>2</sup> Census Report, Madras, 1931, p. 87.

Age group	Per 1000 of total Indians in Malaya			Females per 1000 males
	Total	Males	Females	
0—10	182	136	279	990
10—20	141	124	178	693
20—40	543	588	451	370
40—55	119	138	79	278
55 & over	15	14	13	421

The following figures give the proportion of males and females in the population.

	1931	1921	1911	1901	1891
Number of females per 1000 males (Actual Population)	1,069	1,063	1,078	1,081	1,076

The figures do not show any trend one way or the other.

The emigration drain from this tract does definitely affect the age composition of its population. "A glance at the district figure shows a higher juvenile element in the north than in the south. The south tends also to have a larger proportion of old. Sex proportions are here again of great interest. Ramnad, for example, seems on the total figures an almost exact approximation to the presidency average. The sex-ratios show a wide divergence however, the female element at 15-50 being 53 per 1,000 above the male. Here is shown the influence of emigration and its general nature. Ramnad contributes heavily to Ceylon but more to the tale of casual individual emigrants than the organized family exodus so characteristic of Trichinopoly and the Tamil districts farther north. For Malabar, Tanjore, Tinnevelly and other districts the tale is the same of a markedly higher female proportion in the middle age group. Emigration's hand is clear."<sup>1</sup> The emigration drain on this region also affects the human fertility in these parts. This has been more fully discussed in a later chapter.

1 Census Report, Madras, 1931, p. 111.

### Bombay Deccan.

(Area : 53,327 sq. miles ; Actual Population in 1931 : 10,241,711 ; in 1941 : 11,606,000).

The Bombay Deccan lies behind the Western Ghats stretching inland for more than 150 miles. From the rich Khandesh districts in the north it extends to the equally fertile districts of Karnatak in the south. (Following the Census Superintendent of Bombay for 1931, Karnatak, instead of being treated separately, has been included in this region. It does not, however, include Kolhapur State.) It is a part of the great tableland of the Deccan and Bombay Deccan shares almost all the characteristics of this great tableland. The whole tableland is not alluvial. It has been raised by volcanic forces and earth movements. It is therefore built up of hard rocks covered with thin soil except in the valleys of rivers.

"Perhaps, in no other region of the world" writes Miss Simkins "does the climatic regime enter so much into every aspect of life as in the Indian Peninsula, this from the fact that life here is based on agriculture which is dependent for its very existence on the rainfall and in its turn on the south-west monsoons".<sup>1</sup> Bombay Deccan, lies in the "rain shadow" of the Western Ghats. Here the rainfall is usually about 20 to 25 inches during the year. The southern districts receive better rain owing to the edge of the Ghats being thickly wooded and there being a gap of fourteen miles in the Western Ghats. In other districts of the Bombay Deccan the rainfall is irregular and insufficient. It is in these regions that famine is a frequent occurrence. The Bombay Deccan is drained by the head streams of Godavari, Bhima and Kistna flowing eastward. In the valleys of these rivers the deep black soil is met with and it is highly fertile. The medium black soil extends over the major portion of the Deccan trap, its continuity being broken by the spurs of the Western Ghats, which are covered with red soil. The soils of the Deccan are notorious for their deficiency in nitrogen. The absence of jungles in this part is partly traceable to this fact. The leguminous crops which supply nitrogen to the soil suit them admirably.<sup>2</sup>

The main agricultural problem of this region is the problem of water supply. The following figures show the general agricultural situation.

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<sup>1</sup> Agricultural Geography of the Deccan Plateau of India, Miss E. Simkins, p. 13

<sup>2</sup> Agricultural Journal of India, Vol. XX, p. 8.

TABLE—Agricultural Statistics ( Census Reports )

	Percentage of Total Area		Percentage of cultivable Area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
Deccan (1911)	75	60	80	2	4
Karnatak (1911)	84	71	84	1	2
Deccan (1921)	75	60	81	3	4
Karnatak (1921)	84	72	86	1	3
Bombay Deccan (1931)	74	84	86	2	4

TABLE—Agricultural Statistics ( in acres )

(Bombay Deccan) Year	Cultivable area includ- ing fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	26,027,721	17,857,828	764,629	443,743
1931-32	25,272,225	22,027,548	873,941	633,673
1935-36	25,402,946	22,081,553	904,187	566,353

The cultivated area in 1931-32 was considerably larger than in 1911-12. It, however, practically remained the same in 1935-36. The double cropped area in 1931-32 was nearly 40 p.c. larger than that in 1911-12. In 1935-36, however, it was smaller than in 1931-32.

As has been remarked above, water supply is the most important problem of this region. The figures of the irrigated area in the latter table clearly show that the percentage of the irrigated area to the total cultivated area is very small. Irrigated area in 1935-36 was larger than in 1931-32. The sluggish growth of irrigation is partly due to natural factors which impede the development of canals. The canals of this region are fed by rivers but the topography of the Deccan prevents them from watering large areas. The rivers, being non-perennial sources of water, are not very valuable from the irrigation point of view. Neither is the construction of canals an easy task in this region of hills and rocks. The other source of water is wells. The construction of wells is again a difficult problem. The great depth of the water level in many parts of this region is an impediment to their construction. The southern districts, however, possess a good many storage tanks. A net-work of wells and storage tanks in Dharwar district enables the cultivator to cultivate irrigated crops on a large scale.

The following figures show the crop distribution of this region.

TABLE—Crops ( Census Reports )

	Percentage of gross cultivated area under							
	Rice	Jowar	Bajri	Other cereals	Pulses	Other food crops	Cotton	Other crops
Deccan (1911) }	2	*	*	62	13	*	13	10
Karnatak (1911) }	3	*	*	56	10	*	24	7
Deccan (1921) }	2	25	30	9	10	2	15	7
Karnatak (1921) }	4	36	8	13	9	1	23	6
Bombay Deccan (1931)	2	30	25	7	10	1	13	12

\* Separate figures for these are not available.

TABLE—Crops (Agricultural Statistics)

Bombay Deccan (Year)	Acreage under					
	Rice	Millets	Total food grains	Oil seeds	Cotton	Tobacco
1911-12	536,878	9,750,496	14,113,666	1,246,738	3,447,457	51,040
1931-32	572,151	10,633,070	15,796,859	1,348,777	3,115,956	86,542
1935-36	577,905	10,669,657	15,777,273	1,776,812	3,092,192	78,674

The area under millets in 1931-32 was larger than in 1911-12. The area under oil seeds in 1935-36 was markedly larger than in 1931-32. The area under tobacco in 1931-32 was larger than in 1911-12 or in 1935-36. The area under cotton in 1911-12 was larger than in 1931-32 or in 1935-36. Rice is quite an unimportant crop in this region. The staple food crops of the people are jowar and bajri. The two main production associations of the Deccan plateau centre round its staple food crops—jowar and bajri. The different subzones of cultivation centre round the main staple, jowar. Jowar-cotton-wheat-linseed-pulse association occupies the richest land in the region, that along the banks of the Godavari and the slightly inferior soils of the southern districts of Karnatak. Jowar and cotton are grown as *kharif* crops in rotation and wheat and linseed are grown as *rabi* crops. Gram is a mixed crop cultivated in both the seasons. The southern districts do not represent this association as perfectly as does the northern zone. On regur lands the production association is that of jowar-cotton-bajri-oilseed and pulses. This zone lies along southern Khandesh and along the tract between the Godavari and the Bhima. It occupies the medium black soil. Jowar and cotton are grown both as *kharif* and *rabi* crops. Bajri is essentially a *kharif* crop grown on poorer soil, but sometimes as substitute for jowar. Oil-seeds and pulses are mixed crops, as elsewhere. The bajri-pulse-sugarcane-groundnut-garden zone is found in many parts of the jowar zone. It extends along the leeward slope of the Western Ghats from Khandesh to Belgaum. It is a region of heavy soil but insufficient rain for the cultivation of rice. In this tract irrigation has developed most and is the region of garden cultivation par excellence. Cultivation is intensive for the most part.

Large area farming is a peculiar feature of the jowar zone. Most of the crops are typical of poor soil and scanty rainfall. In the southern districts of Karnatak "we find a sound combination of food crops and other cereals and pulses, with a valuable commercial crop like cotton."<sup>1</sup>

Bombay Deccan is very poor in minerals. Some clays, used for glazing pottery, are met with in the Belgaum district.

The following figures show the average daily employment in large industrial establishments in the Bombay Deccan, in 1937.

		Perennial	Seasonal
I	Textiles.	36,744	...
II	Engineering.	6,449	...
III	Minerals and Metals.	35	...
IV	Food, Drink and Tobacco.	491	4,119
V	Chemicals and Dyes, etc.	1,520	...
VI	Paper and Printing.	3,137	...
VII	Processes connected with Wood, Stone and Glass.	409	...
VIII	Processes connected with Skins and Hides.	76	...
XI	Gins and Presses.	...	22,344
X	Miscellaneous.	3,656	48

In a region like the Bombay Deccan, where the soil is poor in most parts and the water supply so precarious, as to render its agriculture highly unstable, the density of population is necessarily low, as can be seen from the following figures.

	1941	1931	1921	1911	1901	1891	1881
Density per square mile.	216	192	162	177	169	170	148

1 Dr. B. N. Ganguli, "Agricultural Regions of India," in "Economic Problems of Modern India", 1939, p. 29.

The figures show a substantial increase only in the last two decades.

The migratory movements of the population of this tract are not complicated, neither are they of very great significance. The industrial city of Sholapur attracts labourers from the adjoining areas and the Nizam's Dominions. The southern districts of Belgaum and Dharwar receive some immigrants from Konkan. Such immigration as exists is compensated by the flow of emigrants. There is one important channel of emigration. It is emigration to Bombay City. The other migratory movements are of a minor character. The extent of emigration to Bombay City from this region can be studied from the following figures.

Actual number of immigrants into Bombay City from the districts of origin—(Totals for Bombay Deccan excluding Khandesh districts and Karnatak, but Kolhapur State included.)<sup>1</sup>

1931	1921	1911	1901	1891	1881
167,782	239,952	170,250	163,022	116,870	142,793

The following figures show the number of females per 1000 males in actual population in the Bombay Deccan.<sup>2</sup>

	1931	1921	1911	1901	1891	1881
Number of females per 1000 males (Actual Population)	962	967	981	985	974	980

From 1901 the figures show a continuous fall. The figures for 1911 and 1921 are affected by selective mortality due to plague and influenza respectively.

The fertility inquiry carried out in 1931 revealed that 4.04 children are born in the Bombay Deccan per family.<sup>3</sup>

1 Cities of the Bombay Presidency, Census Report, 1931, p. 16.

2 See footnote on p. 40.

3 Census Report, Bombay, 1931, p. 32.

### Surma Valley (Assam).

(Area : 7,450 sq. miles. Actual Population in 1931 : 3,262,029; in 1941 : 3,757,781.)

Surma Valley is a flat plain, about 115 miles long and 60 miles wide, shut in on three sides by hills. The river Surma flows into the Brahmaputra. Surma Valley is an alluvial tract. "In this tract where there is little fall of level the rivers are sluggish and when they overflow enrich the fields with silt."<sup>1</sup> The plain portions of Cachar and the whole plain of Sylhet make up the Surma Valley. The soil of the plains is alluvial.

Like the Brahmaputra Valley, this region also receives a very heavy rainfall. The average annual rainfall of this region is 128 inches. It is heavier than that of Brahmaputra Valley. Cherrapunji, in this region, receives perhaps the highest rainfall in the world, amounting to 600 inches annually.

The sluggish rivers of this region deposit silt on the banks, year after year and the height of the banks increases. Because of this the banks of rivers in this region, unlike those of the Brahmaputra Valley, do not consist of marshes "which are unfit for cultivation, but form the highest and the most fertile tracts of the valley dotted with villages".<sup>2</sup> Large areas of this region are under forests. The uncultivated parts which are level are often covered with grass and reeds, which are sometimes nearly 20 feet in height. The northern part of Cachar abounds in bambu forests. There is also some cultivation of rubber trees.<sup>3</sup>

The general agricultural situation in this region can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports)

Year	Percentage of Total Area		Percentage of culti- vatable area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double Cropped	
1911	73.0	50.0	69.0	3.0	...
1921	66.0	47.0	70.0	9.0	...
1931	*	36.0	*	*	*

<sup>1</sup> Imperial Gazetteer.

<sup>2</sup> Dr. Ganguli "Agricultural Regions of India" in "Economic Problems of Modern India," 1939, p. 8.

<sup>3</sup> Imperial Gazetteer.

\* Separate figures for these are not available.

TABLE—Agricultural Statistics (in acres)

Year	Cultivable area includ-ing fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	4,302,236	2,881,520	...	188,650
1931-32	3,561,878	2,074,557	167,225	200,190
1935-36	4,553,374	2,236,559	188,772	210,519

The cultivated area in 1911-12 was considerably larger than in 1931-32 or in 1935-36. In 1911-12 there was no irrigated land but in 1931-32 there was some irrigated land and in 1935-36 it had increased further. The double cropped area in 1931-32 was larger than in 1911-12. In 1935-36 it had increased still more.

The following figures show the crop distribution in this region.

TABLE—Crops ( Census Reports ).

Percentage of gross cultivated area under

Year	Rice	Oil seeds	Jute	Tea	Other Crops
1911	80.7	3.8	1.3	4.4	9.5
1921	84.4	2.5	0.5	4.7	7.7
1931	80.6	1.6	0.9	6.3	10.0

TABLE—Crops (Agricultural Statistics)

Year	Acreage under				
	Rice	Total food grains	Oil seeds	Jute	Tea
1911-12	2,584,230	2,589,931	74,089	42,369	135,098
1931-32	2,001,028	2,015,091	25,605	5,224	144,336
1935-36	2,157,824	2,171,854	25,305	10,964	142,197

The area under rice in 1931-32 was smaller than in 1911-12. It showed a slight increase in 1935-36 over that of 1931-32. The area under oil seeds shows a decline and so also does the area under jute, though the latter increased slightly in 1935-36. Rice is the principal crop. *Aus* and *aman* paddy are cultivated and the cultivators reap bumper crops with little effort. The other crop of importance is tea.

The mineral resources of this region have not been fully exploited. In the northern part of Cachar there are some oil wells. Platinum is washed out from the banks of Dihing river. According to the latest geological survey there are valuable coal deposits in this region. Coal seams outcrop in almost every deep ravine that discharges into the Sylhet plains between Bagali Bazar and the lime stone outcrops beyond Barasaura.<sup>1</sup>

The following figures give the average daily employment in the large industrial establishments in the Surma Valley, in 1937.

		Perennial	Seasonal
I	Textiles	...	
II	Engineering	178	
III	Minerals and Metals	...	
IV	Food, Drink, Tobacco	30	11,326
V	Chemicals, Dyes, etc.	51	
VI	Paper and Printing	...	
VII	Processes connected with Stone, Wood and Glass	121	-
VIII	Process connected with Skins & Hides	...	
IX	Gins and Presses	...	
X	Miscellaneous	...	

1. Geological Survey of India, 1939.

The following figures give the density of population in this region.

	1931	1921	1911
The density of population per sq. mile.	438	408	395

The figures show a continuous increase.

Like the Brahmaputra Valley this region also attracts immigrants on a large scale. But as compared to the Assam Valley this region contains a smaller number of tea gardens and the flow of immigrants is also smaller than that in the other valley. The population enumerated on tea gardens in the Sylhet and Cachâr districts of this region was roughly 307,000 in 1921 and 329,000 in 1931.<sup>1</sup> The corresponding figures for the Brahmaputra Valley were 615,000 in 1921 and 651,000 in 1931. For the last two decades, however, the Surma Valley had a slightly negative balance of migration. This region lost 14,000 people during 1911-1921 on the balance of migration. Exact figures for the last decade (1921-31) are not available. A part of the emigration consists of the coolies returning to their native places. There is also an intra-provincial movement from the plains of Sylhet to the Assam Valley. Unfortunately the figures regarding this movement are not available.

The following figures give the sex-ratio in the population.

Number of females per 1,000 males. (Actual Population)	1931	1921	1911	1901	1891	1881
	928	937	943	947	948	957

"The proportion of females on tea gardens is much higher in the Surma Valley (913 per 1,000 males) than in the Assam Valley (853). The great reduction since 1921 in the proportion of females on the gardens of both valleys—from 950 to 853 in the Assam Valley and from 976 to 913 in the case of the Surma Valley—is due to the very poor recruitment of women coolies during the decade" (1921-31).<sup>2</sup> "In the Surma Valley the difference between the proportion of sexes in the various age groups is a good deal less than in the Assam Valley but more than that in the Hills. The

1 Census Report, Assam, 1931.

2 Census Report, Assam, 1931, p. 80.

explanation is to be found in the effect of immigration on the age distribution of the population.<sup>1</sup> The sex-ratio of the total population is low, even apart from the tea garden population. The number of females has declined continuously from 1881.

### Gujarat.

(Area : 10,193 sq. miles. Actual Population in 1931 : 3,223,907 ; in 1941 : 4,094,000)

South of Sind, between the Feudatory States bordering on Rajputana and the sea, the fertile and the well cultivated plains of Gujarat stretch southwards to the Konkan. Gujarat, as here constituted, includes British territory only. On the whole this region is a low-land region, but has numerous small hills. Three great rivers, all flowing westward, traverse the land of Gujarat. They are Narbada, Sabarmati and Tapti. At the southern end Gujarat is a wet region but it quickly gets drier as one goes northwards. Gujarat can be divided into three sub-regions, south, central and northern. South Gujarat is the wettest part of the region. Along the coast the climate is equable and healthy. There is a narrow strip where the soil is salt and poor and water brackish. Behind this is a broad strip of rich black soil very suitable for rice and the best kind of cotton. Farther inland the soil is poor and eastern parts of this region are covered with dense unhealthy forests. Central Gujarat is much drier and the 40 inch rainfall line passes through it. Rice can be grown on the low-lying stretches of alluvium bordering the rivers, but millets and cotton are more important. The black cotton soil is found in the south. Northern Gujarat is still drier, and on the whole a flat region with a poor sandy soil. Irrigation is not very important since few of the streams flow all the year. On the whole, excepting some northern parts, Gujarat receives sufficient and regular monsoon rains. The most fertile parts of Gujarat are near the Narbada.

The following figures show the general agricultural situation in this region.

TABLE—Agricultural Statistics (Census Reports).

Year	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivat-ed area Irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	77	50	65	4	4
1921	77	52	68	4	4
1931	81	68	68	3	3

1 Census Report, Assam, 1931, p. 60.

TABLE—Agricultural Statistics (in acres).

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	5,009,592	2,412,598	198,217	71,908
1931-32	5,071,847	4,339,373	106,995	271,150
1935-36	5,018,807	4,412,528	98,667	190,033

The cultivated area in 1931-32 was nearly 80 p. c. larger than in 1911-12.<sup>1</sup> The double cropped area in 1911-12 was very insignificant. But in 1931-32 it had increased nearly four times. The irrigated area showed a decline in 1931-32 and in 1935-36 it was even smaller than in 1931-32.

The following figures show the crop distribution of the region.

TABLE—Crops (Census Report).

Year	Percentage of gross cultivated area under								
	Rice	Jowar	Bajra	Other cereals	Pulses	Other food crops	Cotton	Other crops	
1911	9	*	*	46	12	*	26	7	
1921	10	16	11	20	8	4	22	9	
1931	8	15	9	18	8	1	18	13	

TABLE—Crops (Agricultural Statistics)

Acreage under

Year	Rice	Wheat	Millets	Total food grains	Oil seeds	Cotton	Tobacco
1911-12	117,883	61,868	1,030,925	1,662,269	73,610	659,893	17,243
1931-32	339,579	361,810	1,057,468	2,663,478	174,367	948,584	63,854
1935-36	317,842	302,485	1,020,531	2,465,924	107,108	87,251	226,321

\* Separate figures for these are not available.

1 The great increase in the net cultivated area during 1911-31 is only apparent; for, the net cultivated area during 1911-12 had shrunk greatly, particularly in Ahmedabad district, due to a failure of rains. A more correct idea of the increase will be obtained, if the 1931-32 figures are compared with the average net cultivated area during the quinquennium 1910-14, which was 3,161,244,

The area under both rice and wheat in 1931-32 was considerably larger than the area under both these crops in 1911-12. The area under millets seemed fairly steady. The area under oilseeds in 1931-32 was more than twice the area under oilseeds in 1911-12. Both cotton and tobacco showed considerable increases during 1911-1931. ~~The area under tobacco in 1935-36 was nearly three times that of 1931-32.~~ "There is another combination of crops to be found in the cotton-jowar-wheat zone of Surat, Broach and Baroda, in which rice does not find any place: The cotton and jowar crops are grown here in rotation and have exceptionally high yields. Moreover, the soil is so retentive of moisture that the wheat crop in the *rabi* season is also highly successful. This is a prosperous region, having the sound economic basis of a food crop combined with two commercial crops".<sup>1</sup>

Gujarat is not rich in minerals.

The following figures give the average daily employment in large industrial establishments in Gujarat, in 1937.

		Perennial	Seasonal
I	Textiles	111,323	...
II	Engineering	2,836	...
III	Metals and Minerals	...	...
IV	Food, Drink and Tobacco	464	4,442
V	Chemicals, Dyes, etc.	2,713	...
VI	Paper and Printing	681	...
VII	Processes connected with Wood, Stone and Glass	400	...
VIII	Processes connected with Skins and Hides	215	...
IX	Gins and Presses	243	12,429
X	Miscellaneous	26	...

1 Dr. Ganguli "Agricultural Regions of India", in "Economic Problems of Modern India", 1939, p. 28.

The following figures give the density of population in Gujarat.

	1941	1931	1921	1911	1901	1891	1881
Density per square mile.	402	316	292	276	266	305	282

The figures for 1901 are affected by the mortality of the 1896-97 famine.

There are practically speaking no important migratory movements in Gujarat. The growth of population has been small over the last fifty years. The tract is fairly prosperous and its resources are not being pressed upon. The big textile centre of Ahmedabad attracts many people. But this is strictly an internal movement. There is another channel of migration and that is the flow of emigrants to the city of Bombay. The following figures give the number emigrants from Gujarat (excluding Panch Mahals) into Bombay City, decade by decade.<sup>1</sup>

1931	1921	1911	1901	1891	1881
87,269	63,390	56,006	38,049	42,597	44,703

The people of Gujarat are very well known as traders and merchants. They have old commercial traditions. They freely emigrate as traders to distant parts of India. There is a flow of emigrants to South Africa from Gujarat. This flow is very small in quantity but is continuous over at least 60 or 70 years.

The following figures give the number of females per 1000 males in actual population in Gujarat.<sup>2</sup>

1931	1921	1911	1901	1891	1881
905	915	928	955	945	942

The figures show a continuous decline since 1901. The figures for 1901 and 1921 are affected by the selective mortality due to famine and influenza respectively.

<sup>1</sup> Cities of the Bombay Presidency, Census Report, 1931, p. 16.

<sup>2</sup> See footnote on p. 40

The fertility inquiry, specially instituted in 1931, revealed that in Gujarat the average number of children born per family was 4.06.<sup>1</sup>

### Orissa.

( Area : 8,201 sq. miles. Actual Population in 1931 : 4,202,461. )

Orissa lies between West Bengal and Madras, the Chota Nagpur Plateau and the Bay of Bengal. It is the valley of the Mahanadi river and belongs not to the Ganges Valley, but to the coastal plains of the Deccan. "It stretches along the sea board from the Chilka lake to the Subarnarekha river and comprises the districts of Cuttack, Puri and Balasore. It is a narrow strip fifteen to seventy miles broad, in which three distinct zones are found viz., an unproductive maritime belt, a central plain of rich alluvium, and a hilly submontane tract. The land along the coast is strongly impregnated with salt. It is a low-lying swampy area traversed by sluggish brackish creeks. The central zone forms the delta of the Mahanadi, Brahmani and Baitarani rivers. It is a fertile alluvial plain, intersected by deltaic rivers which throw out a network of branches. In many ways it resembles Bengal. A warm steamy atmosphere favours the same palm and rice cultivation, and all the conditions of a productive but enervated human existence are present. In the western fringe the land rises in rocky undulations, isolated peaks and long ranges of hills, with wooded slopes and fertile valleys."<sup>2</sup>

Orissa receives, on an average, 45 to 55 inches of rainfall annually. It is well watered by the Mahanadi, its tributaries and their canals. Cuttack district enjoys an extensive system of irrigation. Balasore and Puri having a smaller space, intervening between the hills and the coast, are for the most part dependent solely on the rainfall. The south of Balasore enjoys a certain amount of irrigation.<sup>3</sup>

Orissa is peculiarly liable to disastrous river-floods, which spread death and destruction. To control such calamities embankments to the rivers have been constructed. But sometimes these embankments prove mischievous, instead of useful. In their downward course the channels become gradually small capable of

<sup>1</sup> Census Report, Bombay 1931, p. 32.

<sup>2</sup> Bengal, Bihar and Sikkim, L.S.S. O'Malley, Provincial Geography Series, Cambridge, 1917, p. 22-23.

<sup>3</sup> Census Report, Bengal, 1901, p. 24.

passing a small part of the water during floods. Hence escapes like safety-valves are necessary here. The constructed embankments by closing these safety-valves increase the danger of inundation.<sup>1</sup>

The following figures show the general agricultural situation in this region.

TABLE—Agricultural Statistics (Census Reports).

Year	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivated area irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	70.3 ,	55.5	78.3	9.2	18.6
1921	73.2	53.8	73.5	6.5	19.4
1931	73.2	53.6	73.3	4.5	16.2

TABLE—Agricultural Statistics (in acres).

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	3,708,686	2,874,000	628,799	344,000
1931-32	3,959,154	2,748,500	470,390	170,700
1935-36	4,218,009	2,820,580	484,282	416,300

The cultivated area does not show any wide fluctuations. The irrigated area in 1931-32 was smaller than in 1911-12. The double cropped area in 1931-32 was considerably smaller than in 1911-12. In 1935-36, however, it was larger than in 1911-12. The percentage of double cropped area to the total cultivated area has all along been low.

The following figures show the crop distribution in this region.

TABLE—Crops (Census Reports)

Year	Percentage of gross cultivated area under		
	Rice	Other cereals and pulses	Other crops
1911	82.49	7.2	10.3
1921	81.90	7.9	10.2
1931	82.70	6.5	11.0

1. W. A. Inglis, "River Floods considered as a Problem of Indian Administration." The Asiatic Review, October 1926.

TABLE—Crops (Agricultural Statistics ).

Acreage under

Year	Rice	Total food grains	Oil seeds
1911-12	2,646,080	2,883,500	47,600
1931-32	2,429,500	2,609,800	61,000
1935-36	2,682,800	3,966,580	68,200

Rice is the principal crop. Area under rice showed a slight decline in 1931-32. During 1935-36 there seems to be a considerable growth in the total area under foodcrops. Besides rice, however, other crops are of little importance. Orissa depends completely on its rice crop. For Orissa to lose her rice crop is to lose her all, and recovery is always slow.<sup>1</sup>

Orissa is extremely poor in mineral resources. Limestone, sandstone and laterite are found in some parts of the tract.

The following figures give the average daily employment in large industrial establishments in Orissa, in 1937.

		Perennial	Seasonal
I	Textiles	...	...
II	Engineering	498	...
III	Minerals and Metals	...	...
IV	Food, Drink and Tobacco	1,760	94
V	Chemicals, Dyes, etc.	37	...
VI	Paper and Printing	250	...
VII	Processes relating to Stone, Wood and Glass	152	...
VIII	Processes relating to Skins and Hides	...	...
IX	Gins and Presses	...	...
X	Miscellaneous	...	...

1. Census Report, Bihar and Orissa, 1931, p. 46.

The following figures give the density of population in this region.

	1931	1921	1911	1901	1891	1881
Density per square mile	512	486	509	504	471	441

Except for the figure for the year 1921 which is affected by the influenza mortality the figures show a continuous but a slow increase.

There is a large outflow of the population of this region to the industrial centres in Bengal and to tea gardens in Assam. This outflow is seasonal or periodic in character. The following figures give the sex-composition of the population.

Number of females per 1000 males (Actual Population)	1931	1921	1911	1901	1891	1881
	1,092	1,133	1,081	1,055	1,044	1,032

The number of females increased continuously from 1881 to 1921. In 1931 it decreased.

An interesting feature of the age distribution in Orissa was the large proportion of persons aged 15-50 in its population in 1931. "This is due", wrote the Census Superintendent, "to a consistently low birth-rate for many years, coupled with a heavy mortality in the exposed age periods due to unfavourable agricultural conditions."<sup>1</sup>

### North Bihar.

(Area : 21, 796 sq. miles. Actual Population in 1931 : 15, 160, 449.)

North Bihar is the portion of Bihar lying to the north of the Ganges. "It is a flat alluvial formation rising very gradually towards the foot of the Himalayas. It is watered by a number of rivers flowing southwards from the Himalayas, which have gradually raised their beds by the depositing of silt and flow in ridges slightly above the general level of the surrounding country. Most of them are apt to overflow their banks. There are numerous marshes,

some of which are large enough to be regarded as fresh water lakes or lagoons. Some represent the deeper portions of abandoned river beds, e. g. the Kabar Tal in the Monghyr district and a chain of 43 lakes, with an aggregate area of 139 square miles, in Champaran, which mark a former channel of the Gandak".<sup>1</sup> This region was a great centre of indigo cultivation.

North Bihar receives on an average a rainfall of 50 to 55 inches annually. In North Bihar on the whole the total annual rainfall is distributed in such a way that as many as three cycles of plant life can be completed in the course of a year. But the succession of crops and the timing of agricultural operations peculiar to each harvest are so nicely adjusted to seasonable rainfall that the rural economy is very much exposed to the dangers of ill distributed rainfall. In North Bihar the rainfall is fairly seasonable and rarely fails. A large part of this region, which is in the submontane region, can rely, for its water supply, on spill irrigation from numerous tanks and swamps. But in normal years North Bihar requires no irrigation. Moreover the streams in it are non-perennial and so are incapable of feeding any canal system. "Except in the uplands of the south, well irrigation is also out of the question, as the wells cannot stand owing to inundations, and the winter rice crop cannot be irrigated from wells when the rains fail. Thus agriculture in North Bihar is insecure to a great extent in years of drought except in tracts served by wells and canals".<sup>2</sup>

The general agricultural situation in this region can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports)

Year	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivated area Irrigated.
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	89.6	68.2	76.1	26.3	9.8
1921	89.5	64.7	72.3	30.2	11.7
1931	89.5	62.5	69.8	22.3	10.3

<sup>1</sup> Bengal, Bihar, Sikkim, O'Malley, Provincial Geography Series, Cambridge, 1917, p. 20.

<sup>2</sup> Dr. B. N. Ganguli, "Agricultural Regions of India," in "Economic Problems of Modern India," 1939, p. 13.

TABLE—Agricultural Statistics ( in acres )

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	12,461,319	9,371,000	933,404	3,454,300
1931-32	12,435,738	8,987,300	1,037,426	2,806,200
1935-36	12,470,875	7,974,500	971,712	2,339,300

The cultivated area in 1935-36 was considerably smaller than in 1931-32. It was also smaller than in 1911-12. The double cropped area in 1931-32 was considerably smaller than in 1911-12 and it had decreased still further in 1935-36. Thus, the cultivated area and the area cropped more than once have declined *pari passu*.

Dr. Ganguli writes regarding the plain of Tirhut in North Bihar that "there is such an extreme pressure of the population on the soil that barely one acre of every hundred is given rest in any year, and there is an encroachment even upon the mango groves and the scanty reserve necessary for pasturage. In most of the tracts, lying in the plains of Tirhut the growth of population reached its limit by the closing years of the last century. The extreme pressure on the soil has been relieved by emigration and it is interesting to observe that the tracts bordering on the Ganges which were the early centres of dense population have become decadent, and the centre of population has shifted to the rice-tracts of the north".<sup>1</sup>

The distribution of crops in this region is shown by the following figures.

TABLE—Crops ( Census Reports )

Percentage of gross cultivated area under				
Year	Rice	Maize	Other cereals and pulses	Other crops
1911	43.2	6.4	31.8	18.6
1921	41.9	7.7	31.3	19.1
1931	41.80	7.3	31.7	19.2

<sup>1</sup> Trends of Population and Agriculture in the Ganges Valley, Dr. Ganguli, 1938, p. 148.

TABLE—Crops (Agricultural Statistics)

Year	Acreage under				
	Rice	Wheat	Total food grains	Oil seeds	Tobacco
1911-12	4,468,900	560,700	10,449,500	939,200	90,300
1931-32	5,019,800	549,000	9,585,300	788,200	119,000
1935-36	4,094,300	498,400	8,131,300	670,300	124,100

Rice is the most important crop of the region. The area under rice in 1931-32 was larger than in 1911-12. But in 1935-36 it was even smaller than in 1911-12. Both winter and autumn rice constitute 44.09 per cent of the total harvest of North Bihar.<sup>1</sup> Winter rice, which goes along with a high degree of agricultural insecurity because of its liability to total failure in the absence of *hathiya* rainfall, is not an important crop in North Bihar. Maize is one of the important crops of the *bhadoi* harvest in this region. As compared to South Bihar this region produces more oil-seeds and barley. North Bihar was once the centre of indigo cultivation but with the appearance of synthetic dyes this cultivation has declined almost to nothing. Opium has also declined to extinction. Tobacco, a valuable commercial crop, is growing in importance. It is being extensively cultivated in North Bihar.

In North Bihar deposits of minerals in commercial quantities are absent. North Bihar is the chief source of saltpetre in India. Saliferous earth is found in the vicinity of village homesteads. A by-product of it is sulphate of soda, which is used for fattening cattle, manuring certain crops and curing hides.<sup>2</sup>

1 Dr. Ganguli, Op. cit. p. 193,

2 L. S. S. O'Malley, Op. cit.,

The following figures show the average daily employment in large scale industrial establishments in North Bihar, in 1937.

		Perennial	Seasonal
I	Textiles	6,983	...
II	Engineering	1,378	...
III	Minerals and Metals	...	...
IV	Food, Drink and Tobacco	3,486	16,368
V	Chemicals and Dyes, etc.	226	281
VI	Paper and Printing	39	...
VII	Processes relating to Wood, Stone and Glass	...	...
VIII	Processes relating to Skins & Hides	...	...
IX	Gins and Presses	...	25
X	Miscellaneous	...	...

The following figures give the density of population in this region.

	1931	1921	1911	1901	1891	1881
Density per square mile	696	643	647	635	634	529

The above figures show that the density remained practically stationary from 1891 to 1921. The density in 1931 was 696 per square mile. "Indeed with the single exception of East Bengal there is no natural division in the whole of India where density per square mile is so great as in North Bihar."<sup>1</sup>

Both the parts of Bihar lose heavily by emigration outside the province, especially to Assam. The readiness of the people of Bihar to migrate is partly the result of economic necessity. In many parts the pressure of population on land is excessive. The plain of Tirhoot is a case in point. There is a host of landless labourers—they and their families numbered 4½ millions or nearly ¼ of the

<sup>1</sup> Census Report, Bihar and Orissa, 1931, p. 6.

total population of Bihar in 1911.<sup>1</sup> Peasants' holdings are too small to support the peasants. There are no large industries to employ them. So they go out to seek jobs in other parts of India and especially to the tea gardens of Assam. But most of this emigration is periodic or seasonal in character. In winter when the rice crop is harvested these coolies start on their annual pilgrimage. During the last decade from North Bihar alone, has emigration increased though from other parts of Bihar it had remained comparatively steady.<sup>2</sup>

The following figures show the number of females per 1,000 males in North Bihar.

	1931	1921	1911	1901	1891	1881
The number of females per 1000 males (Actual population)	1,001	1,029	1,058	1,064	1,049	1,026

This clearly shows that in the region there is a progressive increase of masculinity as in other regions

There is a noteworthy feature in the age composition of the population of North Bihar. "The year 1896-97 witnessed a famine in North Bihar, the effect of which is still clearly discernible in the relative dearth of persons who today are comprised in the age period 30-40."<sup>3</sup> The following figures bring this out.

Variation per cent. in actual population

North Bihar	1931	1921	1911	1901
All ages	+ 8.2	- 0.7	+ 2.1	+ 0.1
0-10	+ 10.2	- 3.5	+ 4.0	- 3.0
10-20	+ 13.8	+ 3.0	- 3.0	+ 5.7
20-30	+ 15.5	{ - 1.0	+ 3.9	+ 1.3
30-40	+ 4.1	—		

<sup>1</sup> Census Report, Bengal, 1911, p. 171.

<sup>2</sup> Census Report, Bihar and Orissa, 1931, p. 111.

<sup>3</sup> Census Report, Bihar and Orissa, 1931, p. 129.

### Sub-Himalayan Punjab.

(Area : 18,619 sq. miles. Actual Population in 1931 : 6,407,424)

Between the broad cultivated plains of the Ganges Valley and the mountain ranges of the Himalayas there is a belt of a country which is very different from either. This is Sub-Montane or Sub-Himalayan Punjab. It comprises tracts which closely hug the outskirts of the Himalayas, along the east and the north of the province in some cases including—as in Rawalpindi—small portions of the Himalayan hills themselves.<sup>1</sup> The northern districts of this division are hilly in character and for the most part composed of broken country. In the other districts the greater portion of the area is a fairly level plain, where depth to water is small and wells easy to work, except in Ambala.<sup>2</sup>

This tract has an annual rainfall varying from 30 to 40 inches owing to its proximity to the Himalayas which bend the monsoon along their southern face.<sup>3</sup> This is supplemented by irrigation from perennial canals in Ambala and Gurudaspur districts and from hill torrents in the others. In some districts of this region, Attock for example, much of the land consists of sand deposited by mountain torrents. Elsewhere however, the soil is retentive of moisture and is normally good.

The general agricultural situation in this region can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports )

Year	Percentage of Total Area		Percentage of culti-vable area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	64	50	78	14	13
1921	65	49	74	11	20
1931	68	54	78	11	19

1 Census Report, Punjab, 1911, p. 2.

2 Census Report, Punjab, 1931, p. 5.

3 Dr. B. N. Ganguli, "Agricultural Regions of India" in "Economic Problems of Modern India", 1939 p. 19.

TABLE—Agricultural Statistics (in acres)

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
*1911-12	9,683,123	5,733,598	1,000,456	1,947,111
1931-32	8,543,059	6,245,012	1,285,632	931,567
1935-36	7,847,605	6,252,978	1,494,822	1,075,857

The cultivated area in 1931-32 was larger than in 1911-12. The irrigated area in 1931-32 was larger than in 1911-12 but it was even larger in 1935-36. The double cropped area in 1931-32 was considerably smaller than in 1911-12. It had increased slightly in 1935-36. "The submontane region enjoys a fair degree of agricultural security owing to sufficient summer and winter rainfall. Thus in Rawalpindi, Attock, Jhelum and Ambala the percentage of gross cultivated area which is irrigated does not exceed 7 per cent. In other districts, the copious supply of subsoil water and the low cost of construction of wells have favoured a phenomenal development of well irrigation. Moreover the soil is sufficiently charged with moisture to resist any thing but absolute drought."<sup>1</sup> In this region what is really to be dreaded is a fodder famine.

The distribution of crops in this region can be studied from the following figures.

TABLE—Crops (Census Reports)

Year	Percentage of gross cultivated area under			
	Wheat	Rice	Pulses	Other crops
1911	37.2	3.6	18.6	40.6
1921	40.1	4.2	6.3	49.4
1931	40.0	3.0	36.0†	21.0

\* Excluding the figures for Kalsia State.

1 Dr. Ganguli, Op. cit., p. 20

† Includes other cereals also.

TABLE—Crops (Agricultural Statistics).

Year	Acreage under				
	Wheat	Millets	Total food grains	Oil seeds	Cotton
*1911-12	3,235,280	345,412	5,379,702	411,691	211,231
1931-32	2,765,304	793,807	5,284,087	241,723	209,040
1935-36	2,858,821	896,180	5,616,944	158,319	246,257

The area under wheat in 1931-32 was smaller than in 1911-12. The area under millets in 1931-32 was nearly double that of the area under millets in 1911-12. The area under oilseeds shows a decline. The area under cotton in 1935-36 was larger than in 1931-32 or in 1911-12.

Wheat is the most important crop of this region. "Although considerable areas of well-irrigated land have to be devoted to fodder crops owing to the scarcity of pasture land, yet the crops consist of such staples as rice, sugarcane, cotton, maize and wheat. It is artificial irrigation which admits of such superior staples being grown and makes it possible for the farmer to put a larger area under wheat than would be the case if he had to depend on rainfall alone. Again, as the cultivation of well-irrigated land is always more intensive and careful than that of canal irrigated land, the predominance of well-irrigation in this region signifies a higher standard of farming. In fact, as the density of population has increased there has been an extension of well-irrigation and a pronounced tendency to more valuable crops. Thus the area under the more valuable *rabi* crops has increased at the expense of *kharif* area. The area under rice has been less and that under wheat and commercial crops like oil-seeds has been more. Moreover, in the *kharif* harvest itself more valuable crops have taken the place of inferior cereals."<sup>1</sup> In some parts of this region, Sialkot, Gurudaspur, Hoshiarpur and Ambala the climate is temperate and, fruit, notably mango, can be grown with ease. This particular part of the tract, "in richness recalls the plains of Lombardy".<sup>2</sup>

\* Excluding figures for Kalsia State.

1 Ganguli, Op. cit., p. 21.

2 Punjab Peasant in Prosperity and Debt, M. L. Darling, 1925, p. 83.

This region is fairly rich in minerals. Rock-salt is found in Jhelum district. During 1939, in this district, 123,073 tons of salt were worked out. The coal mines at Dandol in Jhelum district were worked by the North-West Railway but these were abandoned in 1911. A small amount is still worked out each year from these mines. There are petroleum wells in the Pindigheb Tahsil of Rawalpindi district. The oil deposits of this place are supposed to be fairly rich. Gypsum occurs in places in large quantities in association with rock-salts. In the same areas potash and magnesium salts are met with but the information about them is still scanty.<sup>1</sup>

The following figures show the average daily employment in large industrial establishments in the Sub-Himalayan Punjab, in 1937.

		Perennial	Seasonal
I	Textiles	2,118	...
II	Engineering	1,005	...
III	Minerals and Metals	850	...
IV	Food, Drink and Tobacco	796	615
V	Chemicals, Dyes, etc	132	...
VI	Paper and Printing	781	...
VII	Processes relating to Stone, Wood, and Glass	2,407	...
VIII	Processes relating to Skins and Hides	59	...
IX	Gins and Presses	...	2,606
X	Miscellaneous	1,904	125

The following figures give the density of population.

	1931	1921	1911	1901	1891	1881
Density per square mile.	344	307	305	322	327	300

<sup>1</sup> Punjab, N. W. F. P. and Kashmir, Sir James Dorie, Provincial Geography Series, Cambridge, 1917.

If the figure for 1881 is left out the figures show a fall till 1911, a slight rise in 1921 and a great increase in 1931. The figures showing a fall are the result of the efflux of people from this region to the Canal Colonies as well as that of the mortality caused by the epidemics of plague, malaria and influenza.

This region is the most densely populated in the whole of Punjab. The secure agriculture and fertility of the soil have helped to increase the population. The opening of the Canal Colonies in 1904 provided a necessary relief to the dense population. Emigrants from four districts particularly, namely Sialkot, Gurudas-pur, Hoshiarpur and Gujarat, have continuously swelled the Canal Colonies. During 1921-1931, for example, this region lost 104,515 persons to the Canal Colonies<sup>1</sup>. The important thing regarding this migratory movement is that it is of the permanent type. The emigrants leave their native homes for good and go to the colonies to make their homes there.

The continuous flow of emigrants has affected the age composition of the population of this region. Hoshiarpur and Jhelum are the areas with the largest proportion of old persons. The proportion is fairly high in Sialkot and Gurudaspur. This is partly attributable to the flow of young and middle-aged emigrants from these places.<sup>2</sup>

The following figures give the proportion of females and males in the population.

	1931	1921	1911	1901	1891	1881
Number of females per 1,000 males (Actual population)	847	852	827	880	863	857

The figure for 1911 is obviously affected by the selective plague mortality of the decade, 1901-1911. The figures show a zigzag movement.

#### West Bengal.

(Area : 14,196 sq. miles. Actual Population 1931 : 8,647,189.)

West Bengal (ancient Rar'h) "is the country to the west of the Bhagirathi and Hooghly rivers, which stretches from the Bay of Bengal to the fringe of the Chota Nagpur Plateau. It

1 Census Report, Punjab, 1931, p. 117.

2 Census Report, Punjab, 1931, p. 134.

includes two distinct zones, one a semi-aquatic rice plain, the other a rolling upland country, which lies outside the true delta."<sup>1</sup> Though outside the Ganges delta the eastern portion of the tract is low and of alluvial formation. Further west laterite begins to predominate and the surface rises and becomes more and more undulating and rocky."<sup>2</sup>

Bengal is called the wet triangle. The whole province is subject to heavy rainfall though there are large local variations due to the proximity of the Himalayas and the sea. West Bengal receives on an average a rainfall of 50 to 60 inches annually. With the exception of the littoral tracts the whole of this region lies in the moribund delta of the Ganges. In the eastern alluvial tract of this region the excess of water due to inundation of land in the rainy season is a difficulty for the agriculturists to surmount. In the western part the soil is porous and dry and the drainage is rapid. Here the whole system of cultivation depends upon the practice of storing up rain water. Hence there is, what is called "terrace cultivation," in this part of West Bengal. In the laterite portions artificial irrigation is essential in abnormal years as protection against a freakish water supply. But the total irrigated area forms a small part of the total cropped area. In the laterite portion of this region the surface is broken up by low ridges, valleys and hills which make any system of canal irrigation impracticable. Again, the catchment area of streams in West Bengal is very small. In the alluvial tracts the flat level of the country makes canal irrigation difficult. Moreover, in normal years, canal irrigation is superfluous as the rains are plentiful.<sup>3</sup>

The general agricultural situation in this region can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports)

Year	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	79.6	53.0	66.4	5.5	20.5
1921	79.0	49.3	62.4	5.4	16.3
1931	78.3	47.5	60.7	5.3	14.2

1 L. S. S. O' Malley Op. cit. p. 5.

2 Census Report, Bengal, 1901, p. 14-15.

3 Dr. Ganguli, Op. cit. p. 266-67

TABLE—Agricultural Statistics (in acres).

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	7,109,189	4,446,600	1,030,126	397,700
1931-32	6,842,714	4,152,100	1,061,066	311,800
1935-36	6,794,050	3,310,000	1,048,041	120,600
1940-41	6,780,467	3,467,000	1,218,268	292,400

The cultivated area shows a decline. The cultivated area in 1940-41 was more than 20 per cent. less than that in 1911-12. The irrigated area has shown an increase during 1935-1941. Otherwise the figures of the irrigated area have been fairly steady. A remarkable feature of this region is the small extent of double cropped land. Double cropping is common to *sali* lands and *suna* lands, the elevation of which is neither too high nor too low. The soil of this region is not renewed annually by river floods and it is capable of bearing only a limited number of crops. Double cropping depends upon rain in the critical months of March, April, May and September and October.<sup>1</sup> In West Bengal rainfall during the critical months is not sufficient. So too there are no floods to keep the soil moist in the winter.<sup>2</sup> Unfavourable natural conditions have been responsible for the small extent of double cropped area.

The following figures show the distribution of crops in this region.

TABLE—Crops (Census Reports)

## Percentage of gross cultivated area under

	Rice	Other food crops	Non food-crops
1911	79.3	10.2	8.3

<sup>1</sup> See East Bengal.

<sup>2</sup> Dr. Ganguli, Op. cit. p. 247.

TABLE—Crops ( Census Reports )

Year	Rice	Other cereals & pulses	Jute	Fruit, vegetables and root crops	Sugarcane & drugs	Fodder & oil
1921	89.0	3.3	1.2	1.4	1.7	3.4
1931	90.8	2.9	1.0	1.6	1.4	2.3

TABLE—Crops (Agricultural Statistics)

Year	Acreage under		
	Rice	Total food grains	Jute
1911—12	3,818,000	4,121,700	92,600
1931—32	4,087,400	4,212,700	30,000
1935—36	3,120,500	3,217,800	25,000
1940—41	3,342,800	3,478,100	64,900

Rice is the principal crop. The area under rice in 1930—31 was larger than in 1911—12. In 1940—41, however, it had declined and was even smaller than in 1911—12. The area under jute in 1931—32 was only one third of that in 1911—12. During 1935—1941 the area under jute had increased. Jute is not, however an important crop in this region. As it exhausts the soil it is sown only in those parts where the soil is renewed annually. Jute is confined to highly manured lands near village sites. Except in the districts of Hugly and Howrah, the area under jute is insignificant. West Bengal grows only 2 per cent. of the total jute grown in Bengal.

In West Bengal the laterite clay soil of old alluvium is very difficult to work, as it turns into a mass of most tenacious mud in the rainy season and becomes as hard as stone in summer. The soil is suitable to winter rice which alone can be grown in some places. Such tracts are extensive and the dependence of the cultivator on winter rice is complete in those areas. If there is a premature break of the monsoons with failure of rainfall in September and October, there is always the danger of a total failure of this crop. "When this crop fails, the farmer has to subsist on maize or inferior millets until the harvesting of rabi crops in spring. But his help-

less condition is easily realised when it is remembered that the area under the *rabi* crops is small and its yield is also likely to be reduced when there is failure of rainfall."<sup>1</sup>

The north-western corner of this region is well-known for the richness of its mineral resources, which have made this part of Bengal a hive of industry. It is here that the Raniganj coal-fields are situated. This coal-field has been worked for a long time, systematic mining having been started a century ago. These coal-fields produced 7,591,495 tons of coal during 1939 and the average daily employment on them was 59,632. The iron ore and the clays found in close proximity to the coal measures partly feed the blast furnaces of Barakar and the pottery works at Raniganj.

The following figures show the average daily employment in the large industrial establishments in West Bengal, in 1937.

		Perennial	Seasonal
I	Textiles	130,999	...
II	Engineering	35,509	...
III	Minerals and Metals	16,918	...
IV	Food, Drink and Tobacco	8,765	...
V	Chemicals, Dyes, etc	3,390	...
VI	Paper and Printing	2,308	...
VII	Processes relating to Stone, Wood and Glass	2,371	...
VIII	Processes relating to Skins and Hides	2,793	...
IX	Gins and Presses	3,607	685
X	Miscellaneous	2,769	...

1. Dr. B. N. Ganguli, "Agricultural Regions of India," in "Economic Problems of Modern India," 1939, p. 12

The following figures give the density of population in this region.

	1931	1921	1911	1901	1891	1881
Density per square mile	618	581	611	595	555	534

The figure for 1921 is affected by the influenza mortality. If that is left out, the figures show a continuous increase.

West Bengal contains two districts, Howrah and Hooghly, which are highly industrialised. These districts attract a considerable number of labourers from outside the province. During the last two decades there has been a falling off in the number of immigrants and an increase in the number of emigrants from this region.

The following figures give the sex-ratio in the population.

	1931	1921	1911	1901	1891	1881
Number of females per 1000 males (Actual Population)	942	963	987	1,001	1,023	1,050

The proportion of females in the population has decreased continuously since 1911.

There are some interesting features in the age composition in this region. "In the Presidency and Burdwan Divisions (Central and West Bengal) in both sexes there is a larger proportion of the population at and over any age taken than in the remaining three divisions. Amongst males in the Burdwan and the Presidency Divisions the larger proportion of adult ages are partly the effect of immigration".<sup>2</sup> In this region the recorded mortality at ages 0—5 and also at the ages 60 and over is the highest of all other natural divisions of Bengal.<sup>3</sup>

West Bengal is a land of defective drainage and is therefore characterised by considerable water logging. This brings in its wake the two diseases of malaria and cholera. Dr. Bentley's figures show the prevalence of malaria in this region as compared to Central Bengal.

1 Census Report, Bengal, 1931, p. 181.

2 Census Report, Bengal, 1931, p. 118.

3 Census Report, Bengal, 1931, p. 139.

## Fever indices.

	1920 Per cent.	1912 Per cent.	1898 Per cent.
West Bengal ...	44.9	32.3	17.3
Central Bengal. <sup>1</sup> ...	33.5	23.7	22.3

"In many decadent areas," writes Prof. R. K. Mukerjee, "the deficiency of water for irrigation, the prevalence of malaria and the spread of *aus* paddy co-exist—all symptomatic of loss of hydrographical balance. The relative dryness will be realised from the fact that the subsoil water level in Burdwan (W. Bengal) is 26 feet in the dry season and 9 feet in the rains; whereas in Dacca and Mymensingh (East Bengal) it varies from 3 to 5 feet in the dry season and is level with the ground surface during the rainy season."<sup>2</sup>

Malaria has more far-reaching effects, for it does not only affect the death-rate but also affects the birth-rate. "The common generalisation that high death-rates and high birth-rates go together does not apply to West Bengal. It is likely that malaria has reduced fecundity for it is significant that there is a somewhat close negative correlation between the incidence of malaria and the birth-rate."<sup>3</sup> A special inquiry regarding fertility and malaria was carried out in three districts of Bengal in 1931. Mr. Griffiths, who examined the data thus collected, came to the conclusion that "immediate incidence of malaria is not itself a trustworthy index of fertility."<sup>4</sup> This conclusion is somewhat conflicting with the remarks of Dr. Ganguli quoted above.

The fertility inquiry conducted in 1931 showed that there was no appreciable difference between the number of children surviving per family in each natural division. For West Bengal the figures were :

Average living births per family (with probable error)  $5.8 \pm 0.14$ .

Average surviving per family (with probable error)  $4.2 \pm 0.10$ .<sup>5</sup>

<sup>1</sup> Malaria and Agriculture in Bengal, Dr. C. Bentley, 1925, Appendix I., p. v.

<sup>2</sup> Regional Balance of Man, Prof. Radha Kapal Mukarjee, 1938, p. 120.

<sup>3</sup> Dr. B. N. Ganguli, Op. cit., p. 209.

<sup>4</sup> Census Report, Bengal, 1931, p. 149.

<sup>5</sup> Census Report, Bengal, 1931, p. 172.

### Indo-Gangetic Plain, East

(Area : 7,388 sq. miles. Actual Population in 1931 : 5,562,087; in 1941 : 6,478,000)

This tract lies in the extreme east of the United Provinces. In it lies the whole of the Benares Division (except Mirzapur) and Azamgarh district in the Gorakhpur division. It lies between the Ghogra and the Ganges, though some parts of Benares and Ghazipur districts are also south of the latter.<sup>1</sup>

The soils in this region are alluvial. The climate is generally moist and equable. On an average it receives a rainfall of 40 inches annually. The region is not liable to draught. The rainfall is more unfailing here than in any other portion of the Gangetic Plain. "On the other hand it is liable to suffer from excessive rainfall. What is of vital importance to agricultural security in this region is the seasonable rainfall rather than its total amount, which is rarely if ever deficient. There is a large area under rice in this region, and famines here are the result of an early cessation of monsoon, which damages all the *kharif* crops generally and creates a danger of fodder famine due mainly to the failure of fodder crops, jowar and bajra. Moreover, the winter rains must also be moderate, otherwise excessive dampness will injure the *rabi* harvest."<sup>2</sup> In the Eastern Gangetic Plain, even in normal years, the problem of water-logging and over-saturation is acute in some districts.

The general agricultural situation in this region can be studied from the following figures.

**TABLE—Agricultural Statistics (Census Reports )**

	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivated area
	Cultivable	Cultivated	Cultivated	Double-cropped	Irrigated
Year					
1911	84.0	65.0	77.5	18.4	44.7
1921	84.4	66.0	78.2	20.9	37.1
1931	84.6	67.5	79.8	19.1	27.5

<sup>1</sup> Census Report, U. P., 1911.

<sup>2</sup> Trends of Population and Agriculture in the Ganges Valley, Dr. Ganguli, 1938, p. 64.

TABLE—Agricultural Statistics (in acres).

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	3,984,016	3,088,386	1,118,182	868,110
1931-32	4,017,451	3,266,702	1,456,117	813,810
1935-36	4,020,311	3,263,335	1,451,734	703,892

The cultivated area in 1931-32 was larger than in 1911-12. It had slightly decreased in 1935-36. The irrigated area in 1931-32 was larger than in 1911-12. The double-cropped area in 1931-32 was smaller than in 1911-12. In 1935-36 it had declined still more. In this region double cropping is extensively practised in alluvial low lands, which are subject to annual inundations, but which do not consist of stiff and heavy clay fit to bear a single crop of *kharif* rice. It is also practised on *karail* tracts over which the current is not very strong during the inundations, and which contain a good deal of alumina and have the property to retain moisture long after the rainy season.<sup>1</sup>

The distribution of crops in this region can be studied from the following figures.

TABLE—Crops (Census Reports)

Year	Percentage of gross cultivated area under				
	Rice	Wheat & barley	Millets	Grams	Other crops
1911	19.2	27.0	13.4	6.8	33.6
1921	22.6	25.2	10.5	8.8	32.2
1931	24.7	24.4	13.0 <sup>a</sup>	9.6	28.3

1 Dr. Ganguli, Op. cit. p. 46.

TABLE—Crops (Agricultural Statistics).

## Acreage under

Year	Rice	Total food grains	Oil seeds
1911-12	732,835	3,476,628	57,617
1931-32	957,856	3,657,893	13,416
1935-36	900,219	3,506,798	6,523

Rice is the most important crop. The area under rice in 1931-32 was considerably larger than in 1911-12. In 1935-36 it had decreased slightly. The area under oilseeds seemed to be on the decline. The cultivation of rice has extended wherever possible by the reclamation of swamp and user lands. There is also increase in the area under early rice which make double cropping possible.<sup>1</sup> In 1931-32, 204,595 acres were under sugarcane and in 1935-36, this had increased to 239,803 acres.

This tract is very poor in minerals.

The following figures give the average daily employment in large industrial establishments in the Indo-Gangetic Plain, East, in 1937.

		Perennial	Seasonal
I	Textiles.	76	...
II	Engineering.	1,424	...
III	Minerals and Metals.	242	
IV	Food, Drink and Tobacco.	224	833
V	Chemicals, Dyes, etc.	256	
VI	Paper and Printing.	320	...
VII	Processes relating to Wood, Stone and Glass.	...	...
VIII	Processes relating to Skins and Hides.	...	...
IX	Gins and Presses.	73	...
X	Miscellaneous.	418	...

1 Dr. Ganguli, Op. cit., p. 103.

The following figures give the density of population in this region.

	1941	1931	1921	1911	1901	1891	1881
Density per square mile	877	753	710	707	748	804	765

The figures for 1901, 1911 and 1921 are affected by famine, plague and influenza respectively. According to Prof. Radhakamal Mukerjee, throughout the Gangetic Plain there is a statistical correspondence between density and double cropping.<sup>1</sup> Extensive double cropping signifies the tendency on the part of the peasant to resort to more intensive subsistence farming in order to feed the growing population.

This region has the highest density of all the natural divisions of the United Provinces. There is no doubt that the pressure on the soil is considerable. The severity of this pressure is evidenced by the almost ceaseless flow of emigrants from this region to other parts of the Province and to distant parts of India. It loses heavily on the balance of migration. This migration is largely semi-permanent. The emigrants go out to Assam and Bengal. This outflow of people, continuing for at least forty years (since 1891 roughly), has developed into almost a habit with the people. It was said in 1911 that there was not a single family in the Benares division which had not sent out one of its members to Assam or Bengal.<sup>2</sup> The amount of money orders paid out in this region from outside was Rs. 240½ lakhs.

The following figures give the sex-ratio in the population.

	1931	1921	1911	1901	1891	1881
Number of females per 1,000 males. (Actual population)	967	971	995	1,039	1,009	991

The number of females increased from 1881 to 1901 and has declined continuously since then.

<sup>1</sup> Prof. Mukerjee, "The Agricultural Regions of the Ganges Plain," Indian Journal of Economics, January, 1928.

<sup>2</sup> Census Report, United Provinces, 1911, p. 97.

"In the Indo-Gangetic Plain, East, the population is somewhat successive due to emigration."<sup>1</sup> The age composition in the Gangetic Plain generally still bears the signs of the havoc of the 1896-97 famines mortality.

### Indo-Gangetic Plain, Central.

(Area : 22,562 sq. miles. Actual Populations in 1931: 12,531,104; in 1941: 14,356,000).

This region includes three districts of the Allahabad Division and nine of the twelve districts in the province of Oudh. It is entirely composed of alluvial soil, with the solitary exception of three Allahabad Tahsils lying south of the Jamna. In addition to the Ganges-Jamna Doab which terminates at the junction of these rivers, this division extends northwards to the bank of the river Ghagra. The three Allahabad Tahsils—Meja, Bara, and Kachhana are more akin to the Central India Plateau.

The region receives less rainfall than the eastern portion. The average annual rainfall in this tract amounts to about 36 inches. "None of the districts shows a tendency to suffer from drought, except Sitapur and Hardoi, where there is a deficiency of the permanent water supply as there are no tanks or canals. . . . As in the eastern portion of the plain, poor monsoon or its early cessation is disastrous in its effects on the *kharif* harvest, and excessive winter rains also have a deleterious effect on the *rabi* harvest."<sup>2</sup>

The districts included in this region are influenced in varying degrees, by both the alluvium of the Ganges and that of the Jamna, which exercise distinct influences on the conditions of agriculture and population. In the Jamna tracts the soil is inferior to that of the trans-Gangetic tracts. In the Jamna tracts the water level is lower than in the Ganges tracts. This increases the difficulties of well irrigation in the former. The density of population is greater in the Gangetic tracts.

The general agricultural situation in this region can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports).

Year	Percentage of Total Area		Percentage of cultivable area		Percentage of culti- vated area
	Cultiv- able	Culti- vated	Culti- vated	Double cropped	
1911	80.9	60.3	74.5	15.0	32.1
1921	81.6	59.7	73.7	17.9	27.9
1931	80.6	57.7	71.6	16.8	30.5

<sup>1</sup> Census Report, U. P. 1931. p. 223.

<sup>2</sup> Dr. Ganguli, Op. cit., p. 65.

TABLE—Agricultural Statistics (in acres).

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	11,666,762	8,591,680	1,937,374	2,090,558
1931-32	11,625,527	8,428,920	2,436,643	1,907,912
1935-36	11,688,014	8,499,467	2,838,560	1,861,059

The cultivated area in 1931-32 was slightly smaller than in 1911-12. In 1935-36, however, it was larger than that in 1911-12. The double cropped area in 1931-32 was smaller than in 1911-12. It had decreased still more in 1935-36. "Double cropping is extensive in the tracts composed of rich Gangetic alluvium which contains clay and sand in almost equal proportions, and which is not only absolutely more fertile but has also a considerable moisture-retaining property."<sup>1</sup>

The crop distribution in this region can be studied from the following figures.

TABLE—Crops (Census Reports).

Percentage of gross cultivated area under					
Year	Rice	Wheat and barley	Millets	Grains	Other crops
1911	15.0	27.2	18.6	11.6	27.6
1921	16.3	26.3	17.9	13.1	26.4
1931	19.1	25.5	15.6	17.7	22.1

TABLE—Crops (Agricultural Statistics).

Acreage under

Year	Rice	Wheat	Total food grains	Oilseeds
1911-12	1,245,199	1,654,690	9,756,759	136,896
1931-32	1,707,730	1,656,245	9,526,296	97,188
1935-36	1,647,643	1,522,819	9,236,882	112,114

1 Dr. Ganguli, Op. cit., p. 48.

The area under rice in 1931-32 was considerably larger than in 1911-12. It had decreased somewhat in 1935-36. The area under wheat in 1931-32 was only slightly larger than in 1911-12. In 1935-36 it had registered a decrease. The area under oil seeds in 1931-32 was smaller than in 1911-12. In 1935-36 it had increased but not to the 1911-12 level. The area under sugarcane has increased considerably during recent years. In 1931-32, 221,493 acres were under sugarcane. In 1935-36, this had increased to 371,344 acres.

The mineral wealth of this tract is negligible.

The following figures give the average daily employment in large industrial establishments in the Indo-Gangetic Plain, Central, in 1937.

		Perennial	Seasonal
I	Textiles	43,876	...
II	Engineering	7,932	...
III	Minerals & Metals	...	...
IV	Food, Drink & Tobacco	2,085	4,493
V	Chemicals, Dyes, etc.	2,467	...
VI	Paper & Printing	2,695	...
VII	Processes relating to Glass, Wood and Stone	320	...
VIII	Processes relating to Skins and Hides	4,492	...
IX	Gins and Presses	256	707
X	Miscellaneous	3,452	157

The following figures give the density of population in this region.

Density per square mile.	1941	1931	1921	1911	1901	1891	1881
	610	555	528	551	572	565	521

The figures for 1901, 1911 and 1921 are affected by famines, plague and influenza mortalities respectively.

From this region, year after year, thousands of emigrants go out in search of employment elsewhere. It loses heavily on the balance of migration. This outflow of persons has been going on since and even before, the turn of the century. It has been noted already that the cultivated and the double cropped area in this region have decreased during 1911 and 1931 in spite of the growth of population. This outflow year after year confirms the impression that there is heavy pressure on the soil in this region. The emigration is of a seasonal or temporary character. The total amount of money orders, paid out in seven districts of this tract, in 1931, was Rs. 378 lakh's.<sup>1</sup>

The following figures give the sex-ratio in the population.

	1931	1921	1911	1901	1891	1881
Number of females per 1000 males (Actual population)	918	921	933	956	952	953

The tendency of the females to decrease at each successive census is also present here.

The efflux of able-bodied men affects the age-composition of the population in this region. In the Indo-Gangetic Plain, Central, population is somewhat secessive due to emigration.

#### Indo-Gangetic Plain, West

(Area : 23,893 sq. miles. Actual Population in 1931 : 12,954,527 ; in 1941 : 15,089,000)

Thirteen districts are grouped together in this division, consisting of the four northern districts of the Meerut Division, six districts of the Agra Division and three districts in Rohilkhand Division. The great part of this division is situated in the Doab between the Ganges and the Jamna, but the Agra and the Muttra districts also extend to the south and the west of the former, and the three Rohilkhand districts, Budaun, Morādabad and Shahajahanpur, are situated entirely north and east of the latter.<sup>2</sup> The greatest part of this region is a sloping plain of alluvials origin, with neither rock

1 Census Report, U. P. 1931 p. 46.

2 Census Report, N. W. Provinces and Oudh, 1901.

nor stone approaching the level of the soil, except for beds of nodular lime stone (*kankar*). The rest consists of those parts of Muttra and Agra, which are on the west or south of Jamna, where there are a great number of ravines, and some redstone hillocks marking the eastern termination of the Arwali hills. These parts are, however, well protected by canals and it is unnecessary to draw any distinction between the two portions.

On an average the region gets a rainfall of 30 inches in year. The meteorological peculiarity of this region is that rainfall is susceptible to sharp deviations from the normal.<sup>1</sup> The rainfall is heavier in the northern part. The region on the whole is liable to unseasonable distribution of rainfall. Another characteristic is that in the summer dry and violent winds combined with the high temperature spell ruin to agriculture. There is reason to believe that these winds are becoming hotter and drier as years pass. "In the district of Etawah the desert is increasing at the estimated rate of 250 acres per annum. The vegetation also shows a change towards xerophytic types".<sup>2</sup>

Being subject to the vagaries of rainfall, artificial irrigation is a factor of considerable importance in this region. Here canal irrigation has superseded well irrigation. This is traceable in a large degree to the natural environment of this region. The nature of the soil and the depth of the water-level in this region are both unfavourable for the sinking of wells. It costs nearly double the amount to irrigate land from wells than that required to irrigate it from canals.<sup>3</sup> The development of canals has increased the level of the sub-soil water making the construction of wells more difficult. The development of canals has, however, revolutionized agriculture in this region by bringing under the plough a vast amount of waste land. It has "increased agricultural productivity not only by calling forth the full powers of the soil and supplying sufficient moisture to it and thus increasing the out-turn of crops, but also by leading to a substitution of valuable *rabi* crops like wheat, maize and sugar cane for the inferior *rabi* crops like barley, juar, bajra and gram."<sup>4</sup>

<sup>1</sup> Trends of Population and Agriculture in the Ganges Valley, Dr. Ganguli, 1938, p. 65.

<sup>2</sup> Regional Balance of Man, Prof. Radha Kamal Mukerjee, 1938, p. 62.

<sup>3</sup> Trends of Population and Agriculture in the Ganges Valley, Dr. B. N. Ganguli, 1938, p. 79.

<sup>4</sup> Dr. Ganguli, Op. cit., p. 78

The general agricultural situation in this region can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports)

Year	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	86.5	69.4	80.2	13.2	30.2
1921	86.0	67.3	78.3	13.8	34.5
1931	85.1	65.4	76.1	13.5	30.5

TABLE—Agricultural Statistics (in acres).

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	13,180,831	10,371,323	3,102,097	4,093,754
1931-32	12,862,036	10,214,778	3,343,536	1,988,658
1935-36	13,018,948	10,330,562	3,487,371	2,000,472

The area under cultivation was slightly smaller in 1931-32 than in 1911-12. It had increased in 1935-36 but not to the 1911-12 level. The irrigated area in 1931-32 was larger than in 1911-12. In 1935-36 it had increased still more. The double cropped area in 1931-32 was only half of that in 1911-12. In 1935-36 it was practically the same as in 1931-32. Double cropping is generally practised on loamy soils of canal irrigated lands. In unprotected parts, where rainfall is ample, double cropping is extensive in the rice fields. "It must be noted that, whereas, in the central and the eastern portions of the plain (Gangetic) double cropping means the production of cheaper varieties of *rabi* grains, in the western portion of the plain extensive double-cropping has enabled the cultivators to raise the cheaper varieties of *kharif* grains, such as maize."<sup>1</sup>

1 Dr Ganguli, Op. cit., p. 57.

The following figures give the crop distribution in the region.

TABLE—Crops (Census Reports)

Percentage of gross cultivated area under

	Rice	Wheat and Barley	Millets	Grains	Other crops
1911	3.3	32.0	19.0	11.3	34.4
1921	3.4	31.5	20.4	9.5	35.2
1931	4.3	31.5	21.6	24.5	28.1

TABLE—Crops (Agricultural Statistics).

Year	Acreage under			
	Rice	Wheat	Total food grains	Oil seeds
1911-12	170,453	2,855,981	10,164,020	128,461
1931-32	411,713	2,557,405	9,145,732	106,989
1935-36	465,188	2,503,070	9,838,325	166,580

The area under rice in 1931-32 was considerably larger than in 1911-12. It had increased still more in 1935-36. The area under wheat in 1931-32 was smaller than in 1911-12. It was still smaller in 1935-36. The climatic conditions of this region make it a wheat region and the development of canal irrigation has led to a considerable increase of wheat cultivation in almost all districts. "We find in this region an enormous increase in the area under wheat mixed with barley, gram or peas. Now wheat alone is almost invariably sown after a fallow; while a mixed crop, at least in a good irrigated land is a sure sign of double cropping. Hence the increase in the area under mixed wheat clearly indicates the tendency to increased cultivation of the cheaper heavy-yielding *kharif* grains like maize rice and other staples which mature early in the year and enable the cultivators to sow a second crop of mixed wheat in the same

season".<sup>1</sup> Rice is an unimportant crop in this region. The area under sugarcane has increased enormously. In 1931-32, 455,019 acres were under sugarcane. In 1935-36, this had increased to 727,249 acres.

The mineral resources of this region are very poor and unimportant. Stone is worked in Agra and Muttra Districts.<sup>2</sup>

The following figures give the average daily employment in large industrial establishments in the Indo-Gangetic Plain, West, in 1937.

		Perennial	Seasonal
I	Textiles	7,066	...
II	Engineering	1,434	...
III	Metals and Minerals	383	...
IV	Food, Drink and Tobacco	1,094	7,406
V	Chemicals, Dyes, etc.	1,545	...
VI	Paper and Printing	484	...
VII	Processes relating to Wood, Stone and Glass	3,449	...
VIII	Processes relating to Hides and Skins	141	...
IX	Gins and Presses	807	5,698
X	Miscellaneous	150	84

The following figures give the density of population in this region.

	1941	1931	1921	1911	1901	1891	1881
Density per square mile	627	542	508	539	545	499	492

The figures for 1911 and 1921 are affected by the mortality from epidemic malaria and influenza respectively.

1 Dr. Ganguli Op. cit. p. 108

2 Imperial Gazetteer.

From this region emigrants have gone out in large numbers to seek employment elsewhere. This process has continued for the last eighty years at least. With the passage of years the flow seems to increase in volume. Most of the migration is of the temporary or periodic type. The emigrants go out, earn money and send the savings home. The amount of money orders paid out in 1931, in five districts of this region, came to Rs. 220 lakh's.<sup>1</sup>

The following figures give the sex-ratio in the population.

	1931	1921	1911	1901	1891	1881
Number of females per 1000 males	841	844	841	868	859	855
(Actual Population)				e		

The figures do not show any trend.

### South Bihar

(Area : 15,081 sq. miles. Actual Population in 1931 : 8,515,579)

South Bihar is the portion of Bihar lying south of the Ganges. It comprises the districts of Shahabad, Patna, Gaya and Monghyr. The greater part of it is an alluvial plain sloping gently northward to the Ganges but farther south the soil changes and becomes more undulating. Much of the southern area is broken country with a fringe of brush wood jungle. The soil is poor and has little or no irrigation. It yields precarious crops. The supply of cultivable land is consequently small. The land to the north, on the other hand, is highly cultivated, extensively irrigated and well populated.<sup>2</sup>

Its climate is drier than that of North Bihar. The annual rainfall averages between 40 to 45 inches. Some portions receive even less than 40 inches of rain annually. "In South Bihar rainfall is scanty and the soil is unretentive of moisture owing to the rapid drainage of the country. At the same time the system of storage tanks and water channels (*Ahars* and *Pynes*) has failed to ensure agricultural security, because under such a system the supply of water depends on local rainfall and fails completely when it is needed most and also because there is no rational control of the flow and distribution of water. Moreover canal irrigation, which is con-

1 Census Report, United Province, 1931.

2 Bengal, Bihar and Sikkim, L. S. S. O'Malley, Provincial Geography Series Cambridge, 1917.

fined to a small area in the west, has little scope for development because excepting the Sone, the rivers are non-perennial and too small to feed any canal system.<sup>1</sup> Well irrigation has also no scope here. Only in south Bhagalpur and south Monghyr wells constitute an important source of irrigation. In other districts the rocky soil in the south has prevented the development of well irrigation. In the north of these districts, where the sub-soil water is near the surface, well irrigation is superfluous. Moreover the demand for water during the critical period of *hathiya* asterism is too great to be met by wells, which are ordinarily suitable for the irrigation of the winter crops.<sup>2</sup>

The following figures show the general agricultural situation in the region.

TABLE—Agricultural Statistics (Census Reports)

Year	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	75.7	59.3	78.3	14.3	22.2
1921	77.1	55.2	71.6	20.2	40.9
1931	78.4	57.6	74.0	23.3	37.7

TABLE—Agricultural Statistics (in acres)

Year	Cultivable area including fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	7,277,013	5,550,100	1,507,380	854,000
1931-32	7,532,924	5,591,200	2,858,491	1,745,800
1935-36	7,536,795	5,546,500	2,754,210	1,552,200

1 Dr. B. N. Ganguli, "Agricultural Regions of India", in "Economic Problems of Modern India" 1939, p. 13.

2 Trends of Agriculture and Population in the Ganges Valley, Dr. Ganguli, 1938, p. 181.

The cultivated area in 1931-32 was only slightly larger than in 1911-12. The irrigated area in 1931-32 was considerably larger than in 1911-12. The area cropped more than once in 1911-12 had almost doubled in 1931-32. This is rather remarkable as compared with the total cultivated area which has remained practically steady.

The distribution of crops in this region can be studied from the following figures.

TABLE—Crops (Census Reports)

Year	Percentage of gross cultivated area under			
	Rice	Maize	Other cereals and pulses	Other crops
1911	44.2	6.5	37.7	11.6
1921	32.0	5.3	52.3	10.4
1931	29.5	5.1	54.3	11.1

TABLE—Crops (Agricultural Statistics)

Year	Acreage under				
	Rice	Wheat	Total food grains	Oil seeds	Tobacco
1911-12	2,901,400	672,100	5,577,800	29,900	13,500
1931-32	5,174,600	635,406	6,523,300	293,600	7,900
1935-36	2,056,100	624,900	6,253,700	337,800	8,100

Rice appears to be the main crop. The area under rice in 1931-32 was considerably smaller than in 1911-12 and in 1935-36 it

had decreased still more. The area under wheat in 1931-32 was smaller than in 1911-12. The most remarkable growth seems to be that of oil seeds. The area under oil seeds in 1911-12 had increased nearly tenfold in 1931-32. It had increased still more in 1935-36. More recently the area under sugarcane has also increased considerably. In 1931-32 it was 95,500 acres and in 1935-36, 130,700 acres.

In South Bihar winter rice is a more important crop than the autumn rice. Winter rice, as is well-known, co-exists with a high degree of agricultural insecurity. "If there is a failure of rainfall during the critical period of *hathiya* asterism towards the end of September or the beginning of October, the winter rice crop cannot, mature, because in this region it is not possible to irrigate the rice fields by artificial means to any considerable extent in the event of a failure of *hathiya* rainfall".<sup>1</sup> In South Bihar *aghani* is the principal harvest. The succeeding second crops therefore consist of cheap catch-crops because the more valuable *rabi* crops, like wheat and barley, are sown before the *aghani* crop is harvested. In abnormal years such catch-crops cannot mitigate economic distress caused by the failure of the winter rice crop. "Winter rice, together with the inferior *rabi* crops, raised by means of double-cropping, predominates in South Bihar."<sup>2</sup>

This region is rich in minerals. It possesses the richest mica producing mines of the world. Mica is quarried in the districts of Gaya and Monghyr. The total output of these districts in 1939 was 15,871 cwts. of mica and the average daily employment in the mica mines was 779 persons. There are slate quarries in the Kharagpur Hills near Monghyr. "Several minerals are found in conjunction with mica. In the pegmatite veins which are the source of mica there have been discovered (i) large crystals of beryl with clear fragments that might be cut into aquamarines, (ii) blue, green and black varieties of tourmaline, (iii) small quantities of apatite (a phosphate of lime), which are thrown away with the waste mica, and (iv) molybdenum, which occurs as isolated plates".<sup>3</sup> But at present the latter are of minor economic importance.

<sup>1</sup> Dr. Ganguli, "Agricultural Regions of India" in 'Economic Problems of Modern India', 1939, p. 14.

<sup>2</sup> Dr. Ganguli Op. cit. p. 15.

<sup>3</sup> L. S. S. O'Malley, Op. cit., p. 97.

The following figures show the average daily employment in the large industrial establishments in South Bihar, in 1937.

		Perennial	Seasonal
I	Textiles	1,209	...
II	Engineering	8,740	...
III	Minerals and Metals	176	...
IV	Food, Drink and Tobacco	2,279	2,274
V	Chemicals, Dyes, etc.	745	77
VI	Paper and Printing	1,512	...
VII	Processes relating to Wood, Stone and Glass	61	...
VIII	Processes relating to Skins and Hides	...	...
XI	Gins and Presses	...	...
X	Miscellaneous	...	...

The following figures give the density of population in this region.

	1931	1921	1911	1901	1891	1881
Density per square mile.	565	502	515	512	531	517

The figures show fluctuations and a very small increase.

Like North Bihar, this region also loses heavily due to emigration. The pressure on the soil and the absence of enough large scale industries to absorb the host of landless labourers are the principal causes for this outflow of people. Most of the emigration is periodic. "Every year thousands leave their villages, after gathering the winter crops, to work in the mills, docks and factories or on roads, fields and railways in Bengal or Assam. They return, for the most part, with their savings after four or five

months to resume their old work. They realise that a few months' labour outside the province provides them with a nest-egg for the year".<sup>1</sup>

The following figures give the proportion of males and females in the population.

	1931	1921	1911	1901	1891	1881
Number of females per 1000 males (Actual Population)	983	1,002	1,034	1,050	1,059	1,045

Here also the progressive decline of females is noticeable. The Census Superintendent of Bihar in 1931 remarks : "Generally speaking the female ratio is high in the south of the province and much lower in the north. Although the balance of migrations is responsible for a good deal it does not by any means account for the general tendency of females to preponderate in the south and males in the north of the province."<sup>2</sup>

#### Konkan (Excluding Bombay City and Suburbs)

(Area : 13,701 sq. miles. Actual Population in 1931 : 3,365,232 ; in 1941 : 3,417,000)

The narrow low-lying coast-strip between the Western Ghats and the Arabian Sea, stretching southwards from the Damanganga river is known as the Konkan. It comprises the districts of Thana, Kolaba, Ratnagiri and North Kanara excluding the Portuguese territory of Goa. The Konkan is a low-lying strip 320 miles in length and roughly 26 to 30 miles wide.<sup>3</sup>

This tract can be divided into two parts ; northern Konkan, the tract lying to the north of the Mahad Creek and roughly co-extensive with the Thana and the Kolaba districts and southern Konkan, the country to the south of it. In the northern part the sea coast is low-lying and profusely infested with sand. The rivers in this part of Konkan are shallow and there are no good harbours. In the southern section the soil is rocky and of poor fertility. But there are many rivers and creeks and the soils along their banks are generally fertile. The northern part is covered with jungle, in which palms grow. The southern part is a country of cocoanut palms and mango groves.

1 L. S. S. O'Malley, Op. cit.

2 Census Report, Bihar and Orissa 1931, p. 138.

3 Imperial Gazetteer.

The Konkan receives the full force of the north-western monsoon rains dashed against mountains behind it. The country is crossed by several short rivers. But these rivers are useless either for navigation or for irrigation. They dry up as soon as the rains stop. They are a great obstacle to the development of roads and communications in the tract.

The rains generally do not fail in Konkan. It receives on an average a rainfall of 80 to 100 inches annually. The drainage of the country is rapid and most of the rainfall is poured back into the sea unused. The soils are mostly alluvial. But as the country is hilly and rugged, they are found at their best, only in the river valleys. The lighter layers elsewhere are not economically very important. The general agricultural situation in this tract can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports)

Year	Percentage of Total Area		Percentage of culti-vable area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	39	48	45	2	3
1921	39	18	45	2	4
1931	47	23	50	2	3

TABLE—Agricultural Statistics (in acres)

Year	Cultivable area includ-ing fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	4,065,950	1,635,701	51,236	77,567
1931-32	4,084,635	1,985,543	56,403	80,835
1935-36	3,988,465	2,017,294	53,864	76,107

The cultivated area in 1931-32 was considerably larger than in 1911-12. It had increased even more than that in 1935-36. The area cropped more than once is only a small percentage of the total cultivated area. In 1935-36 it was smaller than in 1911-12. The poor soil, incapable of retaining moisture and the rapid drainage of the country make extensive double cropping very difficult.

The following figures give the crop distribution in this region.

TABLE—Crops ( Census Reports ).

Year	Percentage of gross cultivated area under				
	Rice	Other cereals	Pulses	Other food stuffs	Other crops
1911	67	19	6	...	8
1921	68	18	4	5	5
1931	52	18	6	2	22

TABLE—Crops (Agricultural Statistics)

Year	Acreage under		
	Rice	Total food grains	Ragi
1911-12	1,028,000	1,585,716	254,597
1931-32	1,049,927	1,583,815	261,000
1935-36	1,063,259	1,589,492	270,986

The area under rice in 1931-32 was larger than in 1911-12. In 1935-36 it was still larger. The area under ragi in 1935-36 was larger than in 1931-32. The area under total food grains seems to be almost steady during all the three years for which figures are given in the above table.

The main crop is rice. It is grown as the *kharif* crop and in some parts of Konkan it is the only crop of the whole agricultural season. Ragi is a supplementary crop in this region. It is grown on light red soils where rice does not thrive. This crop is predominant in the uplands of Konkan. It is especially valuable as a famine crop, as it requires not a large amount of water and takes only four months to mature. The cultivation of the mango fruit is a potential source of income to the people of this region. The fruit is indigenous to Konkan and Konkan mangoes are unrivalled in any part of the country. For a healthy growth of the mango plant no special type of soil or climate is required. The hilly tracts of Konkan are eminently suitable for its cultivation. In certain areas mango gardens have even displaced the cultivation of crops subordinate to rice. The area under mango groves was 8,582 acres

in 1932-1933. On an average Konkan exports annually mangoes worth Rs. 20 lakhs out of which the district of Ratnagiri alone contributes about half.<sup>1</sup>

The Konkan tract was not regarded as very rich in minerals till recently. The recent geological survey has, however, revealed that there are many mineral deposits in Konkan. Chromite, felspar and glass-sand have been met with in the Ratnagiri district and the deposits are supposed to be fairly rich. Iron deposits also have been located in the same district.<sup>2</sup> Regarding them, however, nothing concrete, can be said yet.

The following figures give the average daily employment in large industrial establishments in Konkan (excluding Bombay City and Suburbs) in 1937.

		Perennial	Seasonal
I	Textiles	1,161	...
II	Engineering	1,052	...
III	Minerals and Metals	...	...
IV	Food, Drink, and Tobacco	...	...
V	Chemicals, Dyes, etc.	1,630	212
VI	Paper and Printing	58	...
VII	Processes connected with Stone, Glass and Wood	488	...
VIII	Process connected with Skins & Hides	...	...
IX	Gins and Presses	...	...
X	Miscellaneous	...	...

The following figures give the density of population in Konkan.

	1941	1931	1921	1911	1901	1891	1881
Density per square mile.	358	330	307	299	281	277	256

<sup>1</sup> Report of the Committee on the Improvement of Marketing of Fruit and Vegetable in the Town of Bombay, 1934 p. 98.

<sup>2</sup> Geological Survey of India, 1938.

The population of this tract has found an outlet by way of emigration. They migrate to other parts of the country and particularly to Bombay City, in search of employment. The largest number of emigrants are from the Ratnagiri district which is the most densely populated district. The following figures give the actual number of emigrants from the three districts of Thana, Kolaba, and Ratnagiri to Bombay City.<sup>1</sup>

Year	Persons	Year	Persons
1881	154,747	1911	268,884
1891	206,565	1921	293,543
1901	177,492	1931	282,277

The labourers in the Bombay mills are mostly drawn from Konkan. But the emigrant from Konkan has travelled farther north along the sea coast. The Konkani emigrant is to be met with generally on the West Coast as far north as Karachi. The efflux of people from Konkan is not of a permanent character. It is semipermanent or of the periodic type. Some of the migrants to Bombay are permanent migrants. But their number is small. The majority of them maintain contact with their native land and return to it in their old age. The influx of people from the three districts into the City of Bombay is, strictly speaking, an internal migratory movement, as Bombay City is included in the Konkan region. The City by giving employment to a large body of people from these districts relieves the burden on the region somewhat. It can be said that Bombay City is a permanent and a growing asset of the Konkan-economy. By attracting people from outside the Konkan tract the City of Bombay swells its population.

The following figures give the sex-ratio in the population of Konkan<sup>2</sup> (excluding Bombay City.)

	1931	1921	1911	1901	1891	1881
Number of females per 1,000 males. ( Actual Population )	1,012	1,036	1,038	1,013	1,012	998

1 Cities of the Bombay Presidency, Census Report, 1931, p. 16.

2 See footnote on p. 40

The proportion of females increased during the period from 1881 to 1911 and has declined since then. The fertility inquiry conducted in 1931 revealed that in Konkan, the average number of children born per family was 3.71—a figure slightly lower than that for the Deccan and Gujarat.<sup>1</sup>

### Konkan ( Sub-Section )

Bombay City ( Actual population in 1941 : 1,489,000 ).

"Bombay City as a census unit includes the main Island (town) with the area reclaimed from the sea within the last decade, 1921 to 1931, and four islands in the Harbour, namely Cross Island, Middle Ground, Oyster Rock and Butcher Islands."<sup>2</sup> This definition was adopted at the census of 1921, and was retained at the 1931 census. The area of the City has changed, however, with every census. as can be seen from the following figures.

Year	Acres	Year	Acres
1872	11,930	1906	14,386
1881	14,229	1911	14,576
1891	14,980	1921	15,066
1901	14,342	1931	15,480

The following figures show the variations in the population of the city of Bombay since 1872.

	1931	1921	1911	1901	1891	1881	1872
Actual population	1,161,383	1,175,914	979,445	776,006	821,764	773,196	644,405
Proportionate variation with 1872 as 100	180	182	152	120	128	120	100

<sup>1</sup> Census Report, Bombay, 1931, p. 32

<sup>2</sup> Cities of the Bombay Presidency Census Report, 1931, p. 6.

Except for the decline in 1901 there was a continuous increase till 1921 when there was a slight fall again. The decline in 1901 was chiefly to be attributed to the ravages of plague in that year. "The decrease in the population of Bombay is due to plague mortality and the exodus due to the epidemic."<sup>11</sup> The decrease recorded in 1921 was due primarily to the exodus of labourers to their native villages. The depression of 1929-30 hit the City's industries hard and many mills had to close down. The unemployed labourers returned home, thus depopulating the population of the city.

Mr. Sedgwick remarked in 1921: "The fact that Bombay population is largely immigrant, using the term of course in its widest sense, is well-known. The percentage of the total population which has actually been born in Bombay has steadily declined at each census".<sup>12</sup> The following figures give the percentage of Bombay born.

Year		Year	
1872	3111 per cent.	1901	1996 per cent.
1881	2783 ... ..	1921	1860 ... ..
1891	2580 ... ..	1931	2446 ... ..
1901	2334 ... ..		

The percentage of Bombay born steadily declined till 1921. In 1931 there was a big rise. It seems that the forecast of Mr. Sedgwick did not come true for 1931. "It is perhaps possible", remarks Mr. Shirley "had the enumeration been accurate, that the forecast would have been fulfilled. But the figures as actually recorded do not bring this out".<sup>13</sup> This directly leads to the study of immigration into the city of Bombay. The following figures show the

11 Census Report, Bombay, 1901, p. 283.

12 Census of India, 1921, Vol. IX, p. 165.

13 Census of the Baroda Presidency, Census Report, 1931, p. 114.

actual number of immigrants into Bombay City from the important places of origin at six censuses.<sup>1</sup>

	1931	1921	1911	1901	1891	1881
Gujarat (not including Panch Mahals)	87,269	63,390	56,006	38,049	42,597	44,703
Bombay Deccan (not including Khandesh and Karnatak ) ...	167,782	239,952	170,250	163,022	116,870	142,793
Konkan ( not including Kanara ) ...	282,277	293,543	268,884	177,492	206,565	154,747
Kathiawar	53,288	72,435	58,775	45,531	39,050	32,568
Baroda	6,027	6,349	4,501	5,625	8,857	3,906
Hyderabad State	15,914	19,602	9,302	7,431	9,518	8,525
Madras	21,415	15,156	8,278	6,005	8,276	6,075
Rajputana	8,389	19,722	12,453	10,461	12,907	9,381
United Provinces	83,323	70,911	50,682	...	...	...
Punjab & Delhi	11,837	10,425	8,616	6,116	6,572	2,429
C. P. & Berar	4,814	5,046	3,843	4,330	1,950	2,391
C. I. Agency	3,330	3,360	4,005	2,407	2,966	2,088

"The extent to which the Ratnagiri district contributes to the population of Bombay city is remarkable. In 1931 no fewer than 237,256 persons were returned as born in the Ratnagiri district. This is equivalent to 20·4 per cent. of the total population of the city. The other main contributors are the Surat district 58,275, 5·0 per cent. ; the Kolaba district 32,666, 2·8 per cent. ; the Poona district 66,999, 5·8 per cent. ; the Satara district 53,211, 4·6 per cent."<sup>2</sup>

An examination of the ratio of females to males in each stream of emigration affords some clue to the extent to which that stream is composed of permanent or temporary immigrants. In Bombay Town and Island as a whole the ratio of females to males is 621 to 1,000. For the Bombay born population alone the ratio is 728 to 1,000. If these ratios are compared with those of other districts the inference seems indicated "that a large propor-

1 Cities of the Bombay Presidency, Census Report, 1931, p. 16.

2 Census of India, Vol. IX, 1931, p. 17.

tion of these immigrants do not take their families with them but consist of able-bodied adult males arriving in the city to find work".<sup>1</sup>

The immigrant character of the population of Bombay city has peculiarly influenced its age-distribution. Due to prevailing economic conditions there is always a great degree of difference in age distribution between urban and rural populations. Bombay is par excellence a city of the working type, with a great preponderance of adults in the working stage. Though the other cities of the Presidency exhibit similar features, Bombay shows them with pointed sharpness. The age distribution in Bombay City is very different from that of the Presidency as a whole. The following figures show the distribution per mille of the Bombay City population over the various age-groups at six censuses.<sup>2</sup>

Age group	1931	1921	1911	1901	1891	1881
0— 5	89	58	67	69	80	106
5—10	81	75	67	84	81	104
10—15	74	78	78	92	95	96
15—20	99	94	108	100	110	132
20—25	132	141	151	132	136	134
25—30	155	156	154	140	126	123
30—35	141	138	125	121	108	78
35—40	86	90	80	71	67	78
40—45	61	69	69	74	71	83
45—50	31	34	31	32	34	
50—55	23	33	32	40	42	18
55—60	12	11	11	13	14	26
60—65	9	15	17			
65—70	3	3	4	32	36	22
70 & over	4	5	6			

1 Ibid, p. 18.

2 Cities of the Bombay Presidency, Census Report, 1931, p. 27,

The figures for 1931 show that, while in the Presidency as a whole the number of persons per mille in the age groups 20-25, 25 to 30, 30 to 35, and 35 to 40, are 95, 88, 81 and 65 respectively in Bombay City the figures are 132, 155, 141, and 86. The other cities of the Presidency show figures for these age groups which are much nearer the general Presidency level.

The figures quoted above for the last six censuses "demonstrate the manner in which the age distribution has altered as Bombay has grown in size. It will be obvious that when Bombay was a much smaller place than it is today its population was distributed by age more in the manner in which the population of places like Poona and Sholapur is distributed by age to-day. As it has got bigger the city has become less and less a place for children, and old people. In this it presents the same features as are exhibited in present day New York."<sup>1</sup>

The next discussion centres round the sex-composition of the population. Mr. Sedgwick remarked in 1921 : "It is inevitable that just as the age composition of the city is abnormal so will be the sex composition". The abnormality will be clear if the following figures are compared with the figures for the Presidency as a whole.

	1931	1921	1911	1901	1891	1881	1872
Number of females per 1,000 males. (Actual population)	554	525	530	617	586	664	612

After a decline from 1901 till 1921 there was again a rise in 1931. It is, however, clear that the character of the population of the city is predominantly masculine. This disparity between the sexes (the degree of it) in Bombay city's population is unique in the Bombay Presidency.

<sup>1</sup> *Census of India, Vol. IX, 1931, p. 27.*

The following figures give the average daily employment in large industrial establishments in the Bombay City and Suburbs, in 1937.

		Perennial	Seasonal
I	Textiles	159,633	...
II	Engineering	26,501	...
III	Minerals and Metals	930	...
IV	Food, Drink and Tobacco	2,299	...
V	Chemicals, Dyes, etc.	12,228	55,121
VI	Paper and Printing	6,753	...
VII	Processes connected with Wood, Stone and Glass	3,825	...
VIII	Processes connected with Skins and Hides	331	...
IX	Gins and Presses	554	...
X	Miscellaneous	3,123	...

#### Central India Plateau

(Area : 10,470 sq. miles. Actual Population in 1931 : 2,244,895 ;  
in 1941 : 2,561,000.)

"In the south-west corner of the United Provinces lie four districts belonging to the Allahabad Division which form a part of the tract known as British Bundelkhand. They are situated on the eastern slope of the Central India Plateau and are broken up by low rocky hills, spurs of the Vindhya mountains, covered with stunted trees and jungle."<sup>1</sup>

This region receives on an average a rainfall of nearly 35 inches annually. "Out of the four districts included in this region Hamirpur and Banda lie, in what is called 'the monsoon trough of low pressure' which is affected sometimes by the Arabian sea monsoon current and sometimes by the Bay (of Bengal) current. Consequently they are exposed to variable winds, the rainfall is capricious and irregular, and heavy floods alternate, with long breaks of widespread failure of the monsoon... On the other hand, in Jhansi and Jalaun not only is the rainfall variable and uncertain, but its efficiency is also less owing to the unfavourable conditions of soil and drainage"<sup>2</sup>

<sup>1</sup> Census Report, N. W. Provinces and Oudh, 1901, p. 11.

<sup>2</sup> Dr. Ganguli Op. cit. p. 66

"The soils are totally different from the Doab soil and far less valuable. *Mar*, the best black cotton soil, is no doubt often fertile, whilst good *kabar*, the second quality of black cotton soil, though more difficult to work than *mar*, also produces good crops. There is also a considerable amount of loam. But a very little makes all the difference between a good and a bad season. Black cotton soils are peculiarly retentive of moisture. If there is too much the crops rot. When dry, they are so hard as to be almost unworkable; if there is too little rain nothing can be sown at all. A very closely defined set of favourable circumstances must be present to ensure a good crop. Where the surface is uneven, which always is in the neighbourhood of the smallest water course (all the more so because of the proximity of these water courses to their sources in the Vindhyan Plateau turns most of them into torrents at certain times of the year which may flow in spate for a few days and then degenerate into mere trickles), erosion deprives the soil of its fertile constituents and turns it into what is known as, *rakar*, a soil that has frequently no more consistency or fertility than a gravel heap."

"The tract is specially cursed by the presence of a weed called *kans* which grows to tremendous depth and absolutely prevents any cultivation till it is eradicated. The facilities for irrigation are the poorest and the water level is low and the rivers flow in deep channels. The climate is far from healthy and malaria is very prevalent."<sup>1</sup>

The general agricultural situation in the tract can be studied from the following figures.

TABLE—Agricultural Statistics (Census Reports)

	Percentage of Total Area		Percentage of cultivable area		Percentage of cultivated area Irrigated
	Cultivable	Cultivated	Cultivated	Double cropped	
1911	83.1	45.2	54.4	3.4	6.3
1921	81.0	44.1	54.5	6.3	8.6
1931	81.0	43.3	53.4	5.6	6.9

<sup>1</sup> Census Report, United Provinces 1911, pp. 14, 15

TABLE—Agricultural Statistics (in acres)

Year	Cultivable area includ-ing fallow	Cultivated area	Irrigated area	Area cropped more than once
1911-12	5,375,863	2,944,904	152,457	436,707
1931-32	5,388,846	3,119,307	230,256	174,747
1935-36	5,398,076	3,113,005	389,003	233,489

The cultivated area in 1931-32 was larger than in 1911-12, but the increase was not significant. In 1935-36 it was almost the same as in 1931-32. The irrigated area in 1935-36 was more than double the irrigated area in 1911-12. Double-cropped area is very small as compared to the cultivated area. Double-cropping in this region is made difficult by the scarcity of good soil and the deficiency of the water supply.

The following figures give the crop distribution in the region.

TABLE—Crops (Census Reports)

Percentage of gross cultivated area under

Year	Rice	Wheat and barley	Millets	Gram	Other crops
1911	25	9.8	30.9	29.4	27.4
1921	2.7	15.4	28.4	32.8	20.4
1931	3.7	20.4	23.5	31.1	21.3

TABLE—Crops (Agricultural Statistics)

Year	Acreage under					
	Rice	Wheat	Millets	Gram	Total food stuffs	Oil seeds
1911-12	70,898	419,176	544,082	1,180,215	2,741,386	410,618
1931-32	81,231	521,859	871,732	956,088	2,741,487	365,567
1935-36	97,052	590,960	682,491	1,112,722	3,611,479	300,861

Millets and gram are the important crops. Gram can be grown successfully on various classes of soils. Its importance is considerable in drier regions. The area under millets in 1931-32 was considerably larger than in 1935-36. The area under gram in 1935-36 was larger than in 1931-32 but was smaller than in 1911-12.

This region is not particularly rich in minerals. Small quantities of granite have been obtained from Banda district and of soap-stone from Jhansi and Hamirpur districts<sup>1</sup>.

The following figures give the average daily employment in large industrial establishments in the Central India Plateau, in 1937.

		Perennial	Seasonal
I	Textiles	...	...
II	Engineering	2,106	...
III	Minerals and Metals	...	...
IV	Food, Drink and Tobacco	40	...
V	Chemicals and Dyes, etc.	...	...
VI	Paper and Printing	...	...
VII	Processes connected with Wood, Stones and Glass	27	...
VIII	Processes connected with Skins and Hides	...	...
IX	Gins and Presses	72	...
X	Miscellaneous	...	185

The following figures give the density of population in this region.

	1941	1931	1921	1911	1901	1891	1881
Density per square mile.	245	214	197	211	201	220	215

1 Imperial Gazetteer.

The figures fluctuate between very narrow margins. The figure for 1901 is affected by the famine (1896-97) mortality and that for the year 1921 by the influenza mortality in 1918.

A study of migration figures reveals that migration, except in 1921, has played a very small part in the movement of population. Temporary migrations are to be noted especially after a failure of seasons. Unlike the other natural divisions of the United Provinces this region does not send its emigrants to distant parts. During the last fifty odd years, as the density figures clearly show, the pressure of population such as it may be in 1881, has altered little. If anything, till 1921 it was less than in 1881 and the figure for 1891, the highest recorded, had not been attained even in 1931. The impetus to emigrate has been thus lacking and the population of the region does not show any remarkable migratory activity.

The following figures give the sex ratio in the population of this region.

	1931	1921	1911	1901	1891	1881
Number of females per 1000 males (Actual population)	934	936	959	969	953	948

The proportion of females to males recorded an increase between 1881 and 1901. Since then there has been a continuous decrease.

No separate comments on the age composition of the population of this tract are available. It can be gathered generally, however, that the mortality caused by the severe famines of 1896-97 has unfavourably influenced the age composition of its population.

TABLE—I. Actual and Natural Populations of different regions.

	1921		1911		1901	
	Actual	Natural	Actual	Natural	Actual	Natural
1 East Bengal	19,142,272	19,481,248	17,680,716	17,783,117	15,735,288	15,766,365
2 Chora Nagpur Plateau	12,383,376	12,929,428	12,377,188	12,897,695	10,855,543	11,284,473
3 Sind	...	*	3,513,435	3,228,561	*	*
4 North West Dry Area, Punjab	6,077,674	5,517,062	5,630,699	4,999,269	4,915,348	4,245,430
5 Brahmaputra Valley	*	*	*	*	*	*
6 East Coast Madras, North	12,370,000	12,615,000	12,087,000	12,169,000	*	*
7 " " " South	10,286,000	10,357,000	9,987,000	10,336,000	*	*
8 Bombay Deccan	*	*	6,387,064	6,552,391	*	*
9 Surma Valley	*	*	*	*	*	*
10 Gujarat	*	*	2,803,074	2,792,436	*	*
11 Orissa	3,996,833	4,294,355	4,188,109	4,359,655	4,115,239	4,233,308
12 West Bengal	8,050,642	7,910,238	8,467,596	8,439,525	8,240,076	8,226,169
13 North Bihar	14,007,696	14,215,476	14,102,314	14,374,310	13,834,300	13,985,053
14 Sub-Himalayan Punjab	5,838,896	6,310,880	5,805,081	6,259,523	6,172,187	6,638,477
15 Indo-Gangetic Plain, West	12,145,963	12,290,380	12,887,153	12,934,341	13,145,109	14,080,563
16 " " Plain, Central	11,920,193	12,156,937	12,425,268	12,877,516	12,908,014	13,725,778
17 " " Plain, East	5,248,372	5,619,163	5,231,250	5,666,955	5,516,375	6,038,266
18 South Bihar	7,574,003	8,017,330	7,767,682	8,254,915	7,716,175	8,077,256
19 Konkan	*	*	*	*	*	*
20 Central India Plateau	2,065,297	2,136,379	2,207,923	2,210,083	2,106,085	2,078,008

\* Figures not available.

TABLE-II. Age Composition in Different Regions.

Regions	Age Groups	Distribution of 100 of each sex.						1881		
		1931		1921		1911		1891		
	M	F	M	F	M	F	M	F	M	F
1 Cochin	0—15	42·98	40·47	40·86	39·00					
	15—40	37·75	40·61	39·60	41·33					
	40—60	15·17	14·48	15·52	14·76					
2 Travancore	0—15	42·47	42·37	39·48	39·70	38·98	39·33	37·86	38·46	
	15—40	38·44	39·46	40·70	41·40	40·94	41·64	41·82	42·59	
	40—60	14·77	13·91	15·69	14·35	15·94	14·46	16·34	14·47	
3 East Bengal (Dacca)	0—15	43·07	43·73	42·77	42·81	43·01	43·20			
	15—40	39·80	41·89	39·08	41·18	38·96	40·33			
	40—60	13·55	11·23	13·78	11·87	13·59	11·96			
East Bengal (Chittagong)	0—15	45·19	43·74	44·56	43·38	45·71	44·14			
	15—40	43·10	42·51	37·77	41·40	36·91	40·39			
	40—60	13·22	11·05	13·62	11·65	13·26	11·67			
4 Chota Nagpur Plateau	0—15	43·10	41·78	43·32	41·64	44·16	42·33	44·58	42·98	46·37
	15—40	41·29	40·99	39·22	40·01	38·73	39·30	37·88	38·77	35·86
	40—60	13·83	13·60	14·17	13·96	13·50	13·61	13·99	13·56	13·95
5 Sind	0—15	38·30	40·16	38·13	39·01	38·32	38·73	39·99	40·36	41·81
	15—40	44·22	43·32	42·22	41·27	42·03	41·59	40·34	39·08	38·98
	40—60	14·36	13·22	15·39	14·88	15·60	15·04	15·48	15·67	14·88

**Age Composition in Different Regions—(Contd.)**

Regions	Age Groups	Distribution of 100 of each sex.										1881
		1931		1921		1911		1901		1891		
		M	F	M	F	M	F	M	F	M	F	
6 North West Dry Area, Punjab	0—15	41·68	43·86	41·72	42·99	40·86	42·09	40·78	41·54	42·37	43·05	40·74
	15—40	39·64	39·37	36·52	36·81	37·54	37·66	37·82	38·45	39·67	40·85	35·69
	40—60	14·05	12·72	15·38	14·66	15·64	14·87	15·32	14·50	14·44	12·95	16·91
7 Brahmaputra Valley	0—15	41·26	44·92	40·76	43·11	40·68	42·69	40·16	41·39			
	15—40	40·94	41·05	39·59	41·04	40·14	41·07	41·04	42·06			
	40—60	14·69	11·41	16·09	12·53	15·67	12·55	15·47	12·98			
8 East Coast Madras, North	0—15	39·39	37·75	39·07	37·34	40·17	37·97	41·20	39·03	40·46	38·89	
	15—40	40·10	42·06	37·48	39·19	36·91	38·23	36·46	38·11	37·12	38·59	
	40—60	15·75	14·94	16·95	16·44	16·79	16·31	16·82	16·24	16·12	15·42	
9 " " , South	0—15	38·99	36·60	37·47	35·71	38·54	36·03	40·20	37·27	38·36	36·35	
	15—40	39·42	42·16	38·75	40·22	37·67	39·59	36·97	38·69	38·15	39·66	
	40—60	16·86	16·54	17·81	17·77	17·89	17·93	17·35	17·69	17·02	17·50	
10 Bombay Deccan	0—15	40·33	40·73	40·26	39·99	38·42	37·87	40·35	33·23	39·56	38·72	40·01
	15—40	40·37	40·72	38·27	38·36	39·75	40·46	38·88	39·43	39·64	40·33	40·83
	40—60	15·32	14·38	16·29	15·96	16·98	16·22	16·49	16·07	16·29	15·39	15·60
11 Sutna Valley	0—15	40·80	41·42	41·60	41·62	41·34	41·68	41·41	41·17			
	15—40	41·08	43·48	39·30	41·92	40·17	41·91	40·92	42·60			
	40—60	14·54	12·02	14·94	12·50	14·34	12·26	13·70	12·05			

**Age Composition in Different Regions—(Contd.)**  
**Distribution of 100 of each sex.**

Regions	Age Groups	1931		1921		1911		1901		1891		1881	
		M	F	M	F	M	F	M	F	M	F	M	F
12. Gujarat	0—15	39·27	39·96	39·73	39·68	36·52	35·37	36·42	34·10	38·62	37·00	39·34	37·61
	15—40	41·34	41·07	39·35	38·43	43·55	43·37	45·40	44·88	42·17	42·04	41·24	
	40—60	16·06	15·57	17·01	17·16	16·53	17·00	15·51	17·20	15·66	16·82	15·31	16·55
13. Orissa	0—15	37·08	33·29	39·78	35·23	40·07	36·60	38·98	36·35	40·54	37·80		
	15—40	42·10	44·51	39·15	41·61	39·92	40·52	40·00	39·14	38·83	38·31		
	40—60	17·29	17·91	17·07	17·80	15·51	16·73	16·65	17·47	16·14	16·89		
14. West Bengal	0—15	36·25	35·66	36·00	34·37	37·46	35·45						
	15—40	44·53	45·24	44·44	42·84	44·96	41·96	42·64					
	40—60	15·96	15·03	15·15	15·15	14·44	16·04	16·00					
15. North Bihar	0—15	41·17	38·91	40·37	37·25	41·16	37·53	40·98	37·49	41·28	38·19		
	15—40	39·28	40·92	38·70	40·02	38·39	39·84	38·32	39·60	37·25	38·76		
	40—60	15·81	15·57	16·19	16·36	15·56	15·98	15·89	16·19	16·54	16·42		
16. Sub-Himalayan Punjab	0—15	40·00	41·88	39·42	40·31	38·34	38·93	38·68	37·25	42·35	39·78	39·88	38·56
	15—40	38·36	38·30	36·06	36·26	38·23	38·41	38·36	39·56	41·81	43·12	39·09	39·70
	40—60	15·61	14·55	16·62	16·48	16·62	16·45	16·36	16·70	14·28	13·77	16·14	15·97
17. Indo-Gangetic Plain, West	0—15	38·38	39·70	37·10	37·55	37·10	37·26	37·43	37·12				
	15—40	42·47	41·89	40·57	39·79	40·04	39·73	39·85	39·30				
	40—60	15·43	14·68	17·20	17·27	17·95	17·74	17·89	17·96				

### Age Composition in Different Regions—(Contd.)

Distribution of 100 of each sex.

Regions	Age Groups	1931		1921		1911		1901		1891		1881	
		M	F	M	F	M	F	M	F	M	F	M	F
18 Indo-Gangetic Plain, Central	0—15	37'96	37'64	36'09	35'25	35'71	34'51	37'01	35'41				
	15—40	41'43	41'59	40'11	40'40	40'41	24'41	46'39	65'39	99			
	40—60	16'71	16'37	18'40	18'43	17'95	18'11	17'98	18'09				
19 Indo-Gangetic Plain, East	0—15	41'76	40'23	40'87	38'40	39'01	35'73	39'58	35'83				
	15—40	37'98	39'80	36'14	38'02	39'44	41'14	38'41	40'13				
	40—60	16'17	15'50	17'24	17'04	16'32	16'85	16'74	16'54				
20 South Bihar	0—15	39'72	38'30	39'41	36'74	39'84	36'88	38'50	35'19	40'88	37'49		
	15—40	39'47	40'36	38'05	39'55	38'92	40'37	39'92	40'83	37'21	38'48		
	40—60	16'43	16'02	17'24	16'79	16'28	16'29	16'47	16'96	16'73	16'99		
21 Konkan	0—15	35'01	37'15	32'76	35'74	33'29	35'42	36'11	37'42	35'46	37'44	37'93	38'22
	15—40	47'06	44'61	47'40	43'63	47'06	43'55	43'63	41'61	44'10	41'69	44'23	42'09
	40—60	15'04	14'58	16'05	15'77	15'82	15'97	16'35	16'05	15'97	15'47	14'31	14'08
22 Central India Plateau	0—15	38'97	38'26	39'81	38'05	37'46	35'38	37'43	34'93				
	15—40	43'08	44'28	39'67	38'93	43'44	42'10	42'89	41'75				
	40—60	15'38	15'98	16'71	17'46	15'58	15'56	16'49	18'36				

TABLE—III

Number per mille of total population living in towns.

	Regions	1931	1921	1911	1901	1891	1881
1	Cochin	171	130	120	108	70	
2	Travancore	108	101	62	62	36	48
3	East Bengal	...					
	Dacca	31	27	25	20		
	Chittagong	23					
4	Chota Nagpur Plateau	30	27	20	20		
5	Sind	*	*	*	*	126	107
6	North West Dry Area, Punjab	87	73	70	98†		
7	Brahmaputra Valley	*	*	*	*	*	*
8	East Coast Madras, North	113	106	96			
9	East Coast Madras, South	195	167	159	160		
10	Bombay Deccan	*	*	*	*	Deccan 154	143
						Karna-tak 135	122
11	Surma Valley	*	*	*	*	*	*
12	Gujarat	*	*	*	*	215	199
13	Orissa	39	38	38	40		
14	West Bengal	94	84	73	70	114	
15	North Bihar	29	27	28	30		
16	Sub-Himalayan Punjab	106	92	91	88		
17	Indo-Gangetic Plain, West	163	153	140	156		
18	"   " Central	100	95	92	98		
19	" " East	95	91	92	103		
20	South Bihar	78	72	67	70	65	
21	Konkan	*	*	*	*	88	90
22	Central India Plateau	124	126	120	117		

\* Figures not available.

† Including North-West Frontier Province.

TABLE—IV

	Regions.	Density of* population per sq. mile of cultivated area in		Total average daily employment in large industrial establishments in different regions.	
		1931	1911	Perennial	Seasonal
1	Cochin †	1,535	1,260	5,401	71
2	Travancore †	1,535	1,150	20,247	2,620
3	East Bengal	1,217	1,065	7,850	18,492
4	Chota Nagpur Plateau	...	...	43,308	1,686
5	Sind	647	645	9,934	16,807
6	North-West Dry Area, Punjab	540	514	4,816	16,370
7	Brahmaputra Valley	1,255	819	5,754	29,188
8	East Coast Madras, North	755	665	18,739	4,266
9	" " " , South...	1,060	963	45,108	6,124
10	Bombay Deccan	297	338	52,547	26,511
11	Surma Valley	1,007	654	380	11,326
12	Gujarat	475	746	118,901	16,871
13	Orissa	978	930	2,697	94
14	West Bengal	1,352	1,248	209,429	685
15	North Bihar	1,080	963	12,112	16,674
16	Sub-Himalayan Punjab	660	637	10,052	3,346
17	Indo-Gangetic Plain, West	811	795	16,553	13,188
18	" " " , Central	951	926	67,575	5,357
19	" " " , East...	1,076	1,082	3,033	833
20	South Bihar	975	896	14,722	2,351
21	Konkan	1,457	1,603	4,389	212
22	Central India Plateau ..	460	480	2,245	185

\* Cultivated area as in Agricultural Statistics.

† Densities of population per sq. mile of cultivated area in 1921 for Cochin and Travancore are 1,270 and 1,313 respectively.

### CHAPTER III

#### The Movement of Population in different Regions.

In what follows an account of the "movement of population" in various regions, generally as recorded by the various Census Superintendents, has been given. 'Movement of population' is "a convenient expression sanctioned by statistical usage to denote the combined effects of the two factors, the balance between births and deaths and the balance between emigration and immigration".<sup>1</sup>

The boundaries of the various regions as they were in 1931 have been taken as final. The figures have been adjusted to those boundaries in the Census Reports of that year. The question of increase or decrease of population by the change of boundaries is thus practically eliminated. Care has been taken, however, to note the changes of boundaries and to verify figures in each case.

#### Cochin

The population in Cochin increased more than 100 per cent. during 1881-1931. The following are the percentages of growth.

	1941	1931	1921	1911	1901	1891	1881
Actual	+18.0	+23.1	+6.6	+13.6	+12.33	+20.4	-0.14
Natural		+21.1	+7.5	+15.34			

Cochin loses only a small part of her population through emigration. The Census Commissioner of Cochin for 1921, observed that "emigration and immigration do not play a large part in the State".<sup>2</sup>

From 1875 to 1881 the population decreased by 0.14 per cent. In the next decade, 1881-1891, it increased by 20.4 per cent. "In the absence of any exceptional circumstances, these anomalous variations must be set down to incorrect enumeration".<sup>3</sup> From 1891 to 1901, there was an increase of 12.33 per cent. In this decade there were slight agricultural depressions - unseasonable and irregular rains but harvests on the whole were favourable. In the next decade, 1901-1911, the population registered a growth of 13.6 per cent. The growth was wholly natural. It was aided by the absence of epidemics, as also by the favourable seasons. In this decade rubber was planted on a large scale in the State, for the first time.<sup>4</sup>

1 Census Report, Travancore, 1911, p. 1

2 Census Report, Cochin 1921.

3 Census Report, Cochin 1901, p. 14.

4 Census Report, Cochin 1911, p. 12, 13.

The next decade presents a surprise. The figure of actual population records only a growth of +6·6 per cent. The figure for the variation in the natural population is +7·5 per cent. The emigration figures did not warrant so much decrease in the actual population. There were no exceptional circumstances in this decade. The only explanation could be short counting in 1921. This has been admitted by the Census Commissioner for 1931. He writes : "We have reasons to think that the fall in the rate of increase is partly, if not mainly, to be accounted for by short counting in 1921".<sup>1</sup>

In the next decade the population increased by 23·1 per cent. This increase was unique as it was the greatest of all increases in Cochin's census history. The figure, however, should not be taken at its face value. The short counting in 1921 might account for a difference of about 4 per cent.<sup>2</sup> The decade was on the whole prosperous. There were floods in 1924 and 1929. The ravages of the 1924 floods were widespread and unequalled in severity. On both the occasions a rapid recovery was made from ill effects. There were no epidemics. During this decade the State appears to have gained 39,249 persons from the balance of migration.<sup>3</sup>

*Some facts and figures regarding fertility in Cochin :—* Very recently an investigation was carried out in Cochin and an amount of valuable data was collected regarding the fertility trends in Cochin's population. The following are a few figures of general interest.

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\* Birth and general fertility rates of Cochin women in 1937

	Total population in the sample of both sexes	Total No. of women aged 15-45	Total No. of children liveborn	Birth Rate	General Fertility Rate
All Communities...	18,718	4,170	751	40	180
High Caste Hindus	1,868	375	61	33	162
Nayars	...	5,321	1,246	34	146
Harijans	...	6,147	1,350	42	189
Christians	...	4,140	889	47	219

1 Census Report, Cochin, 1931, p. 6.

2 Census Report, Cochin, 1931, p. 8.

3 Census Report, Cochin, 1931, p. 5.

An adequate idea of fertility of population can be had from tables of specific fertility. These are embodied in the following figures.

Age Groups	Births per 1,000 women				
	High Caste Hindus	Nayars	Harijans	Christians	All Communities
15-19	875	520	680	710	656
20-24	1,040	785	1,055	1,080	976
25-29	1,055	980	1,180	1,405	1,164
30-34	795	920	1,125	1,505	1,142
35-39	385	715	890	1,110	823
40-44	360	410	550	625	513
Total Fertility <sup>1</sup>	4,510	4,330	5,480	6,453	5,274

#### Travancore

The population of Travancore recorded a growth of more than 100 per cent. during 1881-1931. The following are the percentages of growth.

	1941	1931	1921	1911	1901	1891	1881
Actual Population	+19.1	+21.2	+16.8	+16.2	+15.4	+11.8	+10.0

The part played by migration in the movement of population in Travancore can be studied from the following figures.

	Balance of migration (allowance being made for deaths and births)	Percentage to the popula- tion at the beginning of the decade
1891—1901 ...	+ 30,565	+ 1.2 "
1901—1911 ...	+ 11,175	+ 0.4
1911—1921 ...	+ 16,127	+ 0.4
1921—1931 ...	+ 45,302	+ 1.1

<sup>1</sup> Prof. D. Ghosh and Rama Varma, "A Study in Differential Fertility," Proceedings of the 2nd All-India Population Conference, 1938.

It is clear that most of the growth of population in Travancore is natural growth. "The circumstances that contributed to the increase during the four decades, preceding the year 1921, have been described as normal in the previous Census Reports. Famine and epidemics being rare occurrences in Travancore, their effect on the growth of population has been invariably negligible. On the other hand, all the factors which favour a steady increase have been operating freely. The volume of migration has not been large enough to affect the population materially. Any abnormal variation from the usual rate of growth from Census to Census has, therefore, to be attributed mainly to the changes in the rates of births and deaths."<sup>1</sup>

*Prospects of future growth* :—In 1931, at the time of the Census, a very detailed fertility enquiry was conducted in Travancore. This investigation furnishes very valuable material.

"From the results of the enquiry regarding fertility and mortality we see that, out of 119,813 children born to 18,456 women who have passed the child-bearing period, 56,223 are girls. The total fertility of 1,000 women is 5,350 children. The number of girls among these will, therefore, be  $\frac{56,223}{119,813} \times 5,350$  or 2,511. That is to say that, 1,000 girls born now, if all of them pass through the child-bearing period and survive till the close of that period at the present rate of mortality, will give birth to 2,511 future mothers. This is the *gross reproduction rate*. The net fertility of 1,000 girls, after allowing for their mortality, is 3,867 children. The number of girls among these children will be  $\frac{56,223}{119,813} \times 3,867$  or 1,815. In other words, out of 1,000 girls born now, those who reach the child-bearing period and survive till the close of that period at the present rate of mortality, will give birth to 1,815 future mothers. This is the *net reproduction rate*".<sup>2</sup>

From these calculations it appears that the population of Travancore is a highly progressive one. The Census Commissioner of Travancore for 1931 remarked : "The fertility inquiry conducted in Travancore has shown that survival rate increases, instead of declining, with increase of fertility. It is, therefore, possible that Travancore's fertility is rising and mortality declining at the same time. Such a state of affairs, however, cannot last long".<sup>3</sup>

1 Census Report, Travancore, 1931, p. 19.

2 Census Report, Travancore, 1931, p. 153.

3 Census Report, Travancore, 1931, p. 35.

A further refinement of the net reproduction rate of Travancore in 1931 has been attempted in the following on the basis of the available data. For as Mr. David Glass observes : "The net reproduction rate describes the numerical relationship between the potentially fertile women of one generation and those of the next, assuming the maintenance of the given conditions of fertility and mortality. But if these conditions persist the population will, as was first established by Sharp and Lotka in 1911, ultimately have a fixed or a stable age distribution. It will then also have fixed or stable birth and death-rates, and a fixed annual rate of increase. There are, therefore, three questions to be answered. First, what will be the ultimate annual rate of growth ( $r$ ) of a population subject to constant conditions of fertility and mortality ? Secondly, what will be the ultimate stable age-structure of the population, and its birth and death-rates ( $b$  and  $d$ ) ? Thirdly, what will be the numerical course of the chosen population in the period before stability is attained ? Considerations of these questions bring us into a more complex field of demographic analysis in which all the fundamental contributions are those of Dr. A. J. Lotka."<sup>1</sup>

The net reproduction rate was worked out with the aid of specific fertility rates for quinquennial age periods which were given in the Census Report of Travancore (1931), and reduced to females by the use of sex ratio at birth. Life table for Travancore, given in the Travancore Census Report was used. Using Lotka's method,<sup>2</sup> the mean length of a generation and the true rate of natural increase per year worked out to be 26.46 years and +0.02299 per head respectively.

### East Bengal

The population growth in East Bengal during the last sixty years ( 1872-1931 ) amounted to 90.1 per cent. The following are the percentages of growth.

	1931	1921	1911	1901	1891
(Actual Population)	+ 10.2	+ 8.3	+ 12.4	+ 10.4	+ 14.5

<sup>1</sup> Population : Policies and Movements in Europe, D. V. Glass, 1940, p. 405.

<sup>2</sup> For method, see : Population : Policies and Movements in Europe, D. V. Glass, 1940, Appendix.

During 1881-1891 the population recorded a growth of 14.5 per cent. A part of this increase was due to the first really accurate census of many jungle tribes. In the next decade the percentage of growth was + 10.4 per cent. Except in Hill Tipperah, the growth was mostly natural growth.<sup>1</sup> During this decade the region enjoyed prosperous seasons. The Census Superintendent of Bengal in 1901 wrote: "The rapid extension of jute cultivation is one of the great factors in the rising prosperity of East Bengal".<sup>2</sup> In the next decade the population increased by 12.4 per cent. Most of this growth was natural growth. During this decade, however, 54,000 people emigrated to Brahmaputra Valley and colonised there. Most of these colonists were from Mymensingh district. This flow of emigrants continued in the next decade also, which recorded a growth of + 8.3 per cent. In 1921 the emigrants to Brahmaputra Valley numbered 2,58,000. The influenza epidemic took a heavy toll in the Chittagong division but the Dacca Division escaped very lightly. Chittagong lost between 1.5 to 1.8 per cent of its population through influenza and Noakhali, Mymensingh and Tipperah rather over 1 per cent<sup>3</sup>. This region lost roughly 338,000 persons on the balance of migration during that decade.

During the decade, 1921-1931, the population of this tract recorded an increase of 10.2 per cent. The major part of this increase was to be observed in the Dacca Division. The decade was generally healthy and prosperous. The flow of emigrants from the Mymensingh District into the Assam Valley continued vigorously throughout the decade. The total number of emigrants from East Bengal to the Assam Valley came to about half a million, out of which 140,000 came from Mymensingh alone<sup>4</sup>.

#### Chota Nagpur Plateau

Chota Nagpur Plateau has displayed a rapid growth of population over a period of fifty years. From 1881 to 1931 the population increased by 62.1 per cent. The following are the percentages of growth.

	1931	1921	1911	1901	1891
Actual Population	+ 16.7	+ 0.1	+ 14.0	+ 6.4	+ 14.3

1 Census Report, Bengal, 1901, p. 115.

2 Census Report, Bengal, 1901, p. 8.

3 Census Report, Bengal, 1921, p. 33.

4 Census Report, Assam, 1931, p. 52.

The increase of 14.3 per cent., recorded during 1881-1891, was largely due to better enumeration. During that decade there was emigration of coolies in large numbers to Assam and North Bengal. The decade was on the whole prosperous. During the next decade the growth was only 6.4 per cent. There were small local famines during the decade. Emigration to Assam and Bengal continued to be as heavy as that during the previous decade. "The census records a net growth of 7.8 per cent. but if there had been no emigration the growth would have been 10 per cent."<sup>1</sup>

During 1901-1911 the population increased by 14 per cent. "The large increase is partly due to more complete enumeration, in tracts difficult of access, where literate enumerators are comparatively scarce, and partly to natural growth among the people of the aboriginal races"<sup>2</sup>. The greater increase in Orissa States was due to better enumeration, recovery from famine and the influx of cultivators to the waste lands in them. The population of the district of Manbhum had increased by 10 per cent. Most of this increase was due to the extension of collieries. Emigration during this decade was not so heavy as in the previous one.

In the decade 1911-21, the population increased by + 0.1 per cent. which meant that it was stationary. During the decade there was an increase in four districts and a decrease in four others. In Hazaribagh the population decreased except in the industrial areas.<sup>3</sup> "The emigration from Chota Nagpur to non-contiguous parts of other provinces has greatly increased in the last ten years, dating no doubt from the scarcity of 1918-19".<sup>4</sup> On the balance of migration Chota Nagpur Plateau lost about 546,000 persons in the decade. The other equally decisive cause that kept the population stationary was the mortality caused by the influenza epidemic. This was particularly severe in Hazaribagh, Palmau and Ranchi, as can be seen from the following figures.

Losses in 1918-19 in

Hazaribagh	82,000
Ranchi	82,000
Palmau	49,000

1 6.4 is the adjusted figure given in the Census Report of 1931.

2 Census Report, Bengal, 1901, p. 119,

3 Census Report, Bengal, 1911, p. 157.

4 Census Report, Bihar and Orissa, 1921, p. 68.

5 Census Report, Bihar and Orissa, 1921, p. 114.

In the decade 1921-1931, the population recorded a growth of 16.7 per cent. "It seems to be a reasonable inference that in the Chota Nagpur Plateau the rapid increase of population is due in a larger measure to the natural growth. At the same time there is no doubt that emigration was much less common than in the previous decade and the numbers were further swelled by the return to their native districts of many persons, who had emigrated in earlier years."<sup>1</sup> During this decade the total number of immigrants into the region was 755,556. Emigration, for which no exact figures were separately available, was much less than that of the previous decade.

### Sind

The population of Sind increased more than 60 per cent during the last fifty years (1881-1931). The following are the percentages of growth.

	1941	1931	1921	1911	1901	1891
Actual Population	+16.7	+18.5	-6.7	+9.4	+11.7	+19.0

The increase of population has been uneven in Sind. How much of this growth is natural? Separate migration figures for Sind are not available. Throughout its population history, Sind has always shown a positive balance of migration, though its exact value could not be assessed. After the opening of the Sukkur Barrage there has been a considerable influx of people into Sind.

The Census of 1891 recorded a growth of +19.0 per cent. A large part of this growth could be attributed to more correct methods of enumeration. From 1891 to 1901, the population increased by 11.7 per cent. The terrible famine of 1896-97 and 1898-99 did not touch Sind. There is reason to believe that a part of this growth could be attributed to immigration. During the decade 1891-1901 there was plague in south-east Sind. But it did not affect the growth of population. The decade 1901 — 1911 recorded a growth of +9.4 per cent. Sind was practically immune from the ravages of plague. Only Karachi was affected. Sind gained roughly 284,000 persons on the balance of migration. In the next decade 1911-1921, however, there was a decrease of 6.7 per cent. The influenza epidemic in 1918 visited Sind. It reduced the population greatly. Influ-

1 Census Report, Bihar and Orissa, 1931, Page 68.

enza mortality amounted to 189,680. The next decade 1921-1931 witnessed an unprecedented increase of +18.5 per cent. This decade was practically free from famines as also from epidemics. The population was reviving after the influenza epidemic and this process was aided by the long period of agricultural prosperity till 1930. The Census Superintendent of Bombay for 1931 felt that the readiness shown by the Muslim population of this region in rendering individual household returns accurately at that census was also responsible for a part of the growth recorded.<sup>1</sup>

### North-West Dry Area, Punjab

The population in this region during 1881 — 1931 increased by 115.6 per cent. The following are the percentages of growth.

	1931	1921	1911	1901	1891
Actual population	+21.5	+9.4	+17.8	+21.7	+13.2

The population recorded an increase of 13.2 per cent. in 1891. A part of it could be attributed to a more efficient and thorough enumeration at that census. The decade was on the whole good and was free from serious epidemics. The region was recovering from the famine of 1877-78. On the balance of migration this region (as constituted by the Census Superintendent in 1901 excluding the districts of N. W. F. Province) gained roughly 27,000 persons during the decade.<sup>2</sup>

There was an increase of 21.7 per cent. during 1891-1901. "In the North-West Dry Area the decade has been one of expansion. Except Montgomery all districts show considerable increases."<sup>3</sup> The Chenab Colony was opened up in 1892 and people from outside flocked to it in large numbers. The immigrants to the Chenab Colony alone numbered 443,509.<sup>4</sup> On the balance of migration this region gained roughly 669,000 persons during the decade. A large part of the growth of population during this

1 Census Report, Bombay, 1931, p. 16.

2 Census Report, Punjab, 1901, pp. 99, 100, 101.

3 Census Report, Punjab, 1901, p. 71.

4 Census Report, Punjab, 1901, p. 67.

decade was attributable to the very favourable balance of migration.

In the next decade the population recorded a growth of 17.8 per cent. "Every part of it has shown an increase of population, large or small. The only exceptions are the Gugera Tahshil in the Montgomery District, where the population has fallen by 10 per cent. owing to migration into the Chenab Colony and the Head-Quarters Tahshil of the Shahpur District, which has lost 6 per cent. owing to plague and emigration to the Jhelum Colony".<sup>1</sup> This region escaped to a great extent from the ravages of plague and malaria which raged in other parts of the province. On the balance of migration the region gained roughly 631,000 persons during the decade.

During 1911-1921 the population recorded a growth of 9.4 per cent. During that decade there were several epidemics, like plague and influenza in the Punjab. The most important of all was the influenza epidemic in 1918. The following figures give the death rate from influenza.<sup>2</sup>

Shahpur	...	36.5	Jhang	...	44.5
Mianwali	...	41.1	Multan	...	53.9
Montgomery	...	65.4	Muzaffargarh	...	41.6
Lyalpur	...	41.2	Dera Ghazi Khan	...	53.5

The ravages of this epidemic kept the growth of the population quite low. On the balance of migration the region gained roughly 569,000 persons during the decade. Almost the whole of the increase of this decade was attributable to immigration.

In the last decade, 1921-1931, the population increased by 21.5 per cent. The decade was free from epidemics and the seasons were good. The emigrants to the Canal Colonies from all parts of the Province numbered 240,415 persons.<sup>3</sup> As the figures clearly show the inrush of immigrants had abated considerably and the increase recorded in this decade was largely natural in character.

1 Census Report, Punjab, 1911, p. 64.

2 Census Report, Punjab, 1931, p. 51.

3 Census Report, Punjab, 1931, p. 117.

### Brahmaputra Valley

From 1881 to 1931 the population of the Brahmaputra Valley increased by 109·8 per cent. The following are the percentages of growth.

	1931	1921	1911	1901	1891
Actual Population	+22·5	+24·1	+18·7	+5·8	+10·0

The increase of 10 per cent. recorded in 1891 was partly due to better enumeration. The census enumeration was extended to the Lushai Hills for the first time. There were floods in 1881. The havoc that they wrought and the famine that followed them, killed nearly one-third of the population. In the next decade an increase of 5·8 per cent. was recorded. This decade saw the ravages of Kala Azar which reduced the population, roughly by 25 to 30 per cent. The increase was primarily due to the increased immigration. Immigrants, during this decade, increased to three-fourths<sup>1</sup> of a million or nearly 13 per cent. of the population. One-fourth of a million came from Chota Nagpur Plateau, 109,000 from the United Provinces and 84,000 from the Central Provinces, to Assam as a whole.<sup>2</sup> As Brahmaputra Valley contained most of the tea gardens, a large part of these immigrants were naturally attracted to it. In the next decade, 1901-1911, there was an increase of 18·7 per cent. During this decade the tea industry was flourishing. There was a great influx of settlers from East Bengal in the Brahmaputra Valley. In 1911 these colonists numbered 54,000.

During 1911-1921, the population increased by 24·1 per cent. During this decade the number of tea gardens in this region was doubled. It did not suffer severely from the 1920 slump and gained much by immigration. Nearly half of the growth was due to that cause.<sup>3</sup> The stream of colonists from East Bengal to this region had increased greatly. The total number of colonists in 1921 was 258,000.<sup>4</sup> The Census Superintendent of Assam for 1921 remarked : "We have now what seems to be the commencement of a voluntary stream of settlers who are at present most in evidence at the outskirts of the Brahmaputra Valley".<sup>4</sup>

1 Imperial Gazetteer.

2 Census Report, Assam, 1921, p. 8.

3 Census Report, Assam, 1921, p. 38.

4 Census Report, Assam, 1921, p. 23.

The last decade, 1921-1931, recorded a growth of 22.5 per cent. The influx of the colonists from East Bengal continued with increased vigour during this decade also. "As far as I can judge," wrote the Census Superintendent of Assam for 1931 "the number at present (of East Bengal Colonists) must be over half a million. The number of new immigrants from Mymensingh alone has been 140,000"<sup>1</sup> Besides these, the influx of coolies to tea garden also continued. But many of these coolies returned to their native places during the decade. According to the Census Superintendent, their immigration and emigration cancel one another. "Therefore the increase in the population of the Assam Valley at this census must be ascribed primarily to immigration of the East Bengal colonists and to the natural growth of the old population."<sup>2</sup>

#### East Coast Madras, North

The population of this region increased by 38.5 per cent. from 1891 to 1931. The following are the percentages of growth.

	1931	1921	1911	1901
Actual Population	+ 12.2	+3.2	+9.8	+8.8

During the decade 1891-1901 the population increased by 8.8 per cent. The decade was not prosperous. There were three scarcities—in 1891-1892, in 1897 and 1900. The first affected Nellore, the second the districts of Ganjam, Vizagapatam and Godavari, and the third was again felt badly in Nellore and Kistna. The precise effect of each visitation could not be estimated. Unlike Madras and Deccan, however, the number of children under the age of five had not decreased in Ganjam, Vizagapatam and Godavari, though they showed a decrease in Nellore and Kistna.<sup>3</sup> During the next decade a growth of 9.8 per cent. was recorded. There was famine in Ganjam in 1908. In 1901 there came a big cyclone which affected 873 villages.<sup>4</sup> On the balance of migration this region (including the Agency Tracts) lost roughly 102,000 people during the decade,

From 1911 to 1921 the population increased by 3.2 per cent. The increase was well distributed. The only district that had shown a decrease was Ganjam, where population had fallen by

1 Census Report, Assam, 1931, p. 52.

2 Census Report, Assam, 1931, p. 14.

3 Census Report, Madras, 1901, p. 29.

4 Census Report, Madras, 1911, p. 24.

nearly 2 per cent. This decrease in population was due to emigration on account of a famine, which visited that district in 1918-1919.<sup>1</sup> On the balance of migration the region lost roughly 245,000. The most important occurrence during the decade, however, was the influenza epidemic. The following figures show the severity of the epidemic.

	Average death-rate by fever from 1913-1917	Death-rate by fever in 1918	Percentage of increase
East Coast Madras, North	12.6	25.7	104.0

In 1918, the death-rate per 1000 in Kistna, Guntur and Vizagapatam was 131.3, 105.0 and 116.6 respectively.<sup>2</sup> The influenza epidemic was mainly responsible for keeping down the growth in this decade. "Generally speaking, in this division, it is in the most densely populated talukas that, the increase of population is the greatest and *vice versa*. There are, however, exceptions to this rule, for example the Saturu taluka in Vizagapatam."<sup>3</sup>

The population increased by 12.2 per cent. during 1921-31. It was the biggest increase recorded in the population history of this region. "The delta regions in the East and the West Godavari, Kistna and Guntur show interesting variations. Round the Godavari the tendency is for the heaviest increase to come from less populous talukas. In the Kistna delta the reverse is the case. In Guntur, as in other talukas round the Kistna river, the decade has seen a good deal of settlement of depressed classes on the land and this fact has contributed in some measure to the marked growth of population."<sup>4</sup> "The Telugu river deltas have passed through a period of considerable prosperity and development but this is not likely to continue at its rate in the past. The two northern coastal districts are also in the position that, a strong emigration current has entered predominantly into their scheme of existence and its cessation would involve some hardships in readjustment."<sup>5</sup>

1 Census Report, Madras, 1921, p. 20.

2 Census Report, Madras, 1921, p. 14.

3 Census Report, Madras, 1921, p. 20.

4 Census Report, Madras, 1931, p. 41.

5 Census Report, Madras, 1931, p. 46.

### Madras East Coast, South

The population of this region increased by 23·2 per cent, during 1891—1931. The following are the percentages of growth.

	1941	1931	1921	1911	1901
Actual Population	+10·0	+4·7	+3·0	+8·4	+5·4

In 1901, the increase recorded was 5·4 per cent. All the districts showed a fair increase, the lowest being that of Tanjore. The explanation was that "the population had taken to emigrating in large numbers to the Straits, Ceylon and Burma."<sup>1</sup> During the decade there was no famine or scarcity in this region, though other parts of the Presidency suffered from it. In Madura district, the Periyakulam and the Madura talukas showed the most noticeable increases. Both these benefited by the Periyar irrigation works and the former had also become prosperous since the country on the Travancore hills above it was opened out for coffee cultivation.<sup>2</sup>

During 1901–1911 the population recorded a growth of 8·4 per cent. The decade was generally a prosperous one. The increase recorded would have been even greater had there been no loss through emigration. On the balance of migration this region lost roughly 349,000 people. During the next decade the increase was only 3 per cent. "There has been an increase of population in every district except Tanjore, which has lost 1·5 per cent. of its population. All the delta talukas in this district (except Shiyali) show a decline in population."<sup>3</sup> The main cause that kept the population growth so low was the influenza epidemic that put in an appearance in 1918. The severity of the epidemic can be gathered from the following figures.<sup>4</sup>

	Average death-rate by fever from 1913–1917	Death-rate by fever in 1918	Percentage of increase
East Coast Madras, South	4·6	19·9	362·8

1 Census Report, Madras, 1901, p. 31.

2 Census Report, Madras, 1901, p. 30.

3 Census Report, Madras, 1921, p. 21.

4 Census Report, Madras, 1931, p. 14.

A growth of 4.7 per cent. was recorded during 1921-1931. "Low increase in the southern belt is difficult to explain. Ramnad district is not an inviting zone but the same cannot be said of Tinnevelly, Madura, Tanjore, Trichinopoly. Emigration is undoubtedly the chief source." Emigration from Trichinopoly during the decade implied a recurring loss of approximately 13,000 persons per annum. The total loss for the decade at this rate amounted to about 7 per cent. of the 1921 district population.<sup>1</sup>

#### Bombay Deccan.

The population of Bombay Deccan increased by 30 per cent. during 1881 and 1931. The course of this growth has been zigzag. The following are the percentages of growth:

	1941	1931	1921	1911	1901	1891
Actual Population	+13.3	+15	-1	+5	-9	+19

The population of this region was, broadly speaking, stationary during 1872-1881. Between the years 1872 and 1881 came the famine of 1876. "As a result, the population at the 1881 Census fell sharply in the Karnatak Districts and States and the adjacent eastern Districts of the Deccan; this fall counter-balancing a rise in other regions."<sup>2</sup> The three districts, Belgaum, Dharwar and Bijapur, lost nearly three and half lakhs of their population in the famine.<sup>3</sup> During the next decade 1881-1891 the population increased by 19 per cent. The decade was of marked prosperity with absence of famine or epidemics. The region was recovering from the famine of the last decade. Some part of the growth was also due to a better enumeration.

The population decreased by 9 per cent. during 1891-1901. In this decade came the first assaults of the plague and the great famines of 1896-97 and 1899-1900 followed. Except the districts of Dharwar and Khandesh, the least affected by famine, all other districts showed a great decline. Some of the districts showed a fall due to plague, such as Belgaum, which lost nearly 36,000 people

1 Census Report, Madras, 1931, p. 33.

2 Census Report, Bombay, 1921, p. 7.

3 Justice Ranade, "Twenty Years' Review of Census Statistics" in "Essays on Indian Economics", 1898.

due to it. The probable true mortality due to special causes in this region, except the districts of Dharwar and Belgaum, was estimated at 658,344.<sup>1</sup>

The population recorded a growth of 5 per cent. during 1901-1911. Though the seasons were fair during this decade, the plague epidemic raged furiously throughout. Plague mortality amounted to 180,000 in Satara district, 148,000 in Belgaum district, and 144,000 in Dharwar district. The Southern Maratha Jagirs and Kolhapur lost 173,000 people due to plague.<sup>2</sup> Khandesh showed the largest increase, while Nasik, Poona, Ahmednagar, and Sholapur showed considerable increases in spite of lean years. During this decade the region lost about 165,000 persons on the balance of migration. It is really surprising that in spite of all these difficulties, the population recorded an increase of 5 per cent. In this connexion the following is rather suggestive. "The influence of the famines of 1897 and 1900 is well marked in the age-distribution. The number of children under 5 years of age is greater by 30 per cent. than in 1901 while that of children aged 10-15 i. e. survivors of those who were under 5 in 1901, shows a drop of 13 per cent."<sup>3</sup>.

The population decreased by 1 per cent. during 1911-1921. This decrease was mainly to be attributed to the mortality caused by the influenza epidemic. The total loss due to this epidemic in 1918-19 was estimated to be 603,265.<sup>4</sup> The rate of mortality from influenza ranged between 6 and 8 per hundred throughout this region. In the last decade 1921-1931, the population increased by 15 per cent. The decade was free from epidemics and the seasons were on the whole good. The region had made a very good recovery from the maladies of the previous decade.

### Surma Valley

The population of Surma Valley increased by 44.1 per cent. from 1881 to 1931. The following are the percentages of growth.

	1931	1921	1911	1901	1891
Actual Population	+7.2	+3.3	+10.8	+5.3	+11.5

1 Census Report, Bombay, 1901, p. 29.

2 Census Report, Bombay, 1921, p. 26.

3 Census Report, Bombay, 1911, p. 65.

4 Census Report, Bombay, 1921, p. 25.

The growth of 11.5 per cent. recorded in 1891 was largely due to better enumeration. In the next decade 1891-1901, the population increased by 5.3 per cent. During this decade the region was subjected to the serious ravages of Kala Azar. But immigration was considerable. Bulk of the recorded increase was due to this flow of immigrants. Only 1.4 per cent. of the increase was due to natural growth.<sup>1</sup> During 1901-1911 the population recorded a growth of +10.8 per cent. In that decade the tea industry was flourishing. The opening of the Assam-Bengal Railway increased the facilities for the immigrants to come in. Kala Azar and plague were absent during the decade to a marked degree. "For the first time," wrote the Census Superintendent of Assam for 1911, "Brahmaputra Valley has passed Surma Valley in actual population." It is, however, difficult to assess how much of this growth was natural. As the Census Superintendent remarked : "Surma Valley's natural population cannot be estimated exactly for statistics of emigration and immigration are collected for whole districts".<sup>2</sup> The population increased by 3.3 per cent. only during 1911-1921. In the earlier years of the decade the tea industry was flourishing. But in 1918-19 there came a very severe slump, after the collapse of the Russian market. Surma Valley was particularly hard hit by this slump. The tea-garden population numbered 307,000 in 1921. It lost on the balance of migration and the loss amounted to 14,000. This excess of emigration was particularly due to bad condition of the tea industry in 1918-19 and in a less degree to people leaving the crowded parts of Sylhet for new lands in the Assam Valley.<sup>3</sup> The increase in the natural population amounted to 4 per cent. only. The growth was checked by the visit of Kala Azar in 1917.

In the last decade, 1921-31, the population increased by 7.2 per cent. On the whole this region lost on the balance of migration during the decade. The population on tea-gardens amounted to 329,000 in 1931. "It is difficult to assign any particular reason for this increase (of population). Probably it is due to the absence of any violent epidemics than to any other cause. Public health in the valley, except for sporadic outbreaks of cholera, was generally good and Kala Azar, which was found to be very prevalent in Sylhet, has been brought under control."<sup>4</sup>

1 Census Report, India, 1911, p.p. 59, 60.

2 Census Report, Assam, 1911, p. 21.

3 Census Report, Assam, 1921, p. 8.

4 Ceasus Report, Assam, 1931, p. 22.

### Gujarat

From 1881 to 1931 the population of Gujarat increased by 12 per cent. The following are the percentages of growth.

	1941	1931	1921	1911	1901	1891	1881
Actual Population	+26.9	+8	+6	+4	-13	+8	+2

From 1872 to 1881 the population increased by 2 per cent. only. "The Gujarat Districts, excluding Panch Mahals, did not suffer in any way from the Famine (1876-78), and the slow progress of population there appears to be due partly to external checks, such as Cholera and Fever mortality, and partly, to the operation of prudential and preventive influences."<sup>1</sup> During 1881 to 1891 the population recorded a growth of 8 per cent. This inter-censal period was free from famines and epidemics. The next decade recorded a decline of 13 per cent. "Gujarat, having previously been considered outside the famine zone, was stricken in 1899-1900 by an almost complete failure of crops, partially repeated in 1900-1901 and has not escaped infection from the plague centre of Bombay City."<sup>2</sup> The famine took a heavy toll in Gujarat and mortality from privation was great. "The formidable decrease in population in Gujarat is almost entirely to be attributed to mortality and is only in a slight degree the result of fewer children being born."<sup>3</sup> Probable mortality due to famine, cholera and plague in Gujarat in 1891-1901 amounted to 496,841.<sup>4</sup>

From 1901 to 1911 the population increased by .4 per cent. All the districts recorded fairly even growths. The whole country was recovering from the terrible famines of the previous decade. Panchmahal district and Mandvi taluka of Surat, which suffered most in the famine, showed the greatest increases.<sup>5</sup> Kaira suffered from plague, the loss from it amounting to 70,000. The period 1911-1921 witnessed a growth of 6 per cent. The seasons had been on the whole fair. The Influenza epidemic (1918-19) was the dominant factor influencing growth in this decade. The loss from influenza during these years amounted to about 100,085.<sup>6</sup> In some places

<sup>1</sup> "Twenty Years' Review of Census Statistics", Justice M. G. Ranade, in "Essays on Indian Economics", 1899, p. 203.

<sup>2</sup> Census Report, Bombay, 1901, p. 22.

<sup>3</sup> Census Report, Bombay 1901, p. 83.

<sup>4</sup> Census Report, Bombay, 1901, pp. 27, 28.

<sup>5</sup> Census Report, Bombay, 1911, p. 29.

<sup>6</sup> Census Report, Bombay, 1921, p. 25.

there was an outbreak of plague also, but it was not so serious. During the last decade, 1921-1931, the population increased by 8 per cent. This was the largest increase since 1891 and it would have been even larger had there been no underenumeration at the 1931 Census.<sup>1</sup> The decade was prosperous. The health of the tract was not impaired by any epidemic. The seasons had all along been fair.

### Orissa

From 1881 to 1931 the population of Orissa increased by 158 per cent. The following are the percentages of growth.

	1931	1921	1911	1901	1891	1881
Actual Population.	+5.1	-4.6	+0.9	+7.1	+6.8	+17.6

The movement of population in Orissa must be traced from the terrible famine of 1866. That famine was so severe that one million people were said to have died of sheer starvation. The whole of this tract was abandoned as it were, after this famine. The decade 1872 to 1881 recorded a growth of 17.6 per cent. A part of this growth was due to correct enumeration. The extent of underenumeration in 1872 could be seen from the fact that in Cuttack district the actual population, in the opinion of the Magistrate, exceeded the census figures by at least 100,000.<sup>2</sup> The population recorded a growth of 6.8 per cent. between 1881 and 1891. Some of this increase was again due to improvement in enumeration. During this decade, in 1885, there was a cyclone in Cuttack which wiped out the inhabitants of (in all) forty-five villages. The northern part of Balasore suffered from malaria. In the next decade, 1891-1901, the growth recorded was + 7.1 per cent. This increase was solely due to natural growth. During this decade, the tract "enjoyed a placid period of peaceful development and the rate of growth was remarkably uniform throughout. The increase is wholly due to natural growth and would have been slightly greater, but for a small adverse balance of migration."<sup>3</sup> The net loss due to migration was 151,000 persons. There is little or no immigration in Orissa. During 1901-1911 a growth of only +0.9 per cent. was recorded. This decade witnessed the opening of the Bengal Nagpur Railway. This to some extent encouraged emigration and the loss due to emigration was 231,000 persons roughly.<sup>4</sup>

1 Census Report, Bombay, 1931, p. 13. 2 Census Report, Bengal, 1901, p. 97.

3 Census Report, Bengal, 1901, p. 118. 4 Census Report, India, 1911, p. 65.

The next decade recorded a decrease of 4.6 per cent. The influenza epidemic was not so severe in Orissa, though it left its mark on the rate of growth. In Cuttack and Balasore together 71,000 people died in the influenza epidemic. There was a failure of rain in 1918 and there were also disastrous floods. Emigration continued unabated and the loss on the balance of migration was roughly 297,000 persons. During the last decade, 1921-1931, the population increased by 5.1 per cent. Many of the emigrants returned home with the onset of the depression in 1929-30. "Her actual numbers increased by 5.1 per cent. but at least half of this increase was due to migration, and not to natural growth."<sup>1</sup> The decade was not very favourable. There were failures of rains and floods too. Only during the last three years of the decade did the region enjoy good seasons free from floods.

### West Bengal

From 1872 to 1931 the population of West Bengal increased by 13.77 per cent. The following are the percentages of growth.

	1931	1921	1911	1901	1891	1881
Actual Population ...	+7.4	-4.9	+2.8	+7.2	+4.0	-2.7

The first decade showed a decrease of 2.7 per cent. This was because of the terrible calamity of the "Burdwan Fever" during that decade. The next decade recorded a growth of 4.0 per cent. Though the "Burdwan Fever" was dying out in this decade it was present in the early years of it, especially in the districts of Burdwan and Birbhum. Cholera was also present in some of the districts. The small percentage of population growth in the decade was not surprising. In the next decade, 1891-1901, the population recorded a growth of 7.2 per cent. Most of the districts were recovering from the ravages of Burdwan Fever. Howrah district gained by immigration, its proximity to the metropolis being its chief attraction. No less than 17 per cent. of its people came from outside.<sup>2</sup> Burdwan also gained due to the immigration of labour to Asansole coal mines. During this decade, however, the balance of migration was trifling. There were local variations only.<sup>3</sup> In view of this fact, most of the

1 Census Report, Bihar and Orissa, 1931, p. 46.

2 Census Report, Bengal, 1901, p. 112.

3 Census Report, Bengal, 1901, p. 132.

growth must have been natural growth. During the next decade, 1901-1911, the population increased by 2.8 per cent. The greatest increase recorded was in Howrah, 10.9 per cent. This was mostly due to the influx of labourers. "The two purely alluvial districts (Hooghly and Howrah) owe their increase mainly to the influx of population attracted by the prospect of employment in industrial and manufacturing concerns and by their proximity to Calcutta. The alluvial tracts elsewhere, which are remote from Calcutta, and which have no larger industries or manufactures have suffered from persistent unhealthiness and are more or less decadent or stationary. In the laterite area, however, there has been a small advance. Asansole has gained by 4.7 per cent. but mostly through the influx of labourers to the collieries."<sup>1</sup> In the next decade, 1911-1921, the population recorded a decrease of 4.9 per cent. During the decade the region was subjected to the ravages of influenza. "The decrease of population was found to be greatest over a strip of country running from north to south in Western Bengal, and lying just east of the line marking the transition from the new alluvial soil of the delta to the undulating laterite formation to the west of it."<sup>2</sup> Burdwan and Birbhum districts each lost 3 per cent. of their population through influenza. Bankura lost 2½ per cent. of its population. This region gained roughly 140,000 people, on the balance of migration, during the decade.

During the last decade, 1921-1931, the population increased by 7.4 per cent. The largest increase occurred in the metropolitan areas of Howrah and Hooghly. A decrease had been recorded notably in the section of the country running from north to south, beginning in the eastern sub-division of the Bankura District. Elsewhere there had been a general increase.<sup>3</sup> The decade was on the whole prosperous and without any major epidemic.

#### North Bihar

From 1881 to 1931 the population in North Bihar has increased by 16.2 per cent. The following are the percentages of growth.

	1931	1921	1911	1901	1891	1881
Actual Population ...	+8.3	-0.7	+1.9	+0.1	+5.9	+14.0

1 Census Report, Bengal, 1911, p. 151.

2 Census Report, Bengal, 1921, p. 27.

3 Census Report, Bengal, 1931, p. 38.

The increase recorded in 1881 is largely fictitious. The growth is partly due to the increased efficiency of enumeration and partly to the inclusion of new territories. In 1891 the growth recorded was 5.1 per cent. A part of this growth was due to more correct enumeration. Except the district of Champaran, which had gained by immigration, all districts showed a natural increase in numbers. The flow of emigration was assuming a bigger proportion during this decade. The next census recorded a growth of 0.1 per cent. only. The population stood where it was in 1891. How far was this to be attributed to the severe famines that visited the country in 1896-97? The Census Superintendent of Bengal for 1901 remarked that no connection between the two could be traced. The districts which suffered severely from the famines showed the largest increase, as in Durbhanga. The real causes which checked the growth of the population in this region were the epidemics of cholera and malaria.<sup>1</sup>

During 1901-1911 the population increased by 1.9 per cent. There was a succession of bad harvests in the middle of the decade and there were fevers also. Public health was indifferent. During the decade plague mortality amounted to 166,000 in North Bihar.<sup>2</sup> All these factors checked the growth of population. The flow of emigration was rapid and as large as before. On the balance of migration this region lost roughly 271,000 people during the decade. During the decade 1911-1921, the population declined by 0.7 per cent. During this decade cholera, plague, and influenza were prevalent at different times. Emigration from North Bihar decreased in this decade. There was also an influx of immigrants into North Bihar from Nepal. Nearly 30,000 Nepalis found their way to this region. On the balance of migration it lost roughly 207,000 persons during the decade. The growth of population was checked primarily because of the influenza epidemic of 1918 which took a heavy toll in this region. Influenza mortality in the districts of Muzaffarpur, Darbhanga and Saran amounted to 120,000, 109,000 and 69,000 respectively.

The growth of 8.5 per cent. recorded in the next decade 1921-1931 was the greatest ever recorded, in the census history of this region "North Bihar is the only division," wrote the Census Superintendent of Bihar and Orissa for 1931, "in which the natural growth of population was more rapid than its actual growth—or in other words, where the flow of migration during this period was,

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1. Census Report, Bengal, 1901, p. 117.

2. Census Report, India, 1911, p. 65.

on the balance, in an outward direction."<sup>1</sup> In view of the fact that during this decade (1921-1931) emigration in general, increased from North Bihar the increase in population must have been more than even 8.3 per cent. After remaining steady from 1891 to 1921, this sudden spurt of growth during the last decade was really surprising. It is true that the decade was free from any epidemics and the seasons were on the whole prosperous. "The matter of surprise," to quote the Census Superintendent again, "is that, however marked the improvement in economic conditions, these teeming districts (Darbhanga and Purnea being exceptions) should have found it possible to support so substantial an addition to their numbers as they have been in fact burdened with."<sup>2</sup> Was the increased emigration from North Bihar, during this decade, only an overt manifestation of this pressure on the soil? The Census Superintendent of Bihar and Orissa for 1931 came to that conclusion. He wrote: "It is significant that, during the decade 1921-1931, the only districts whose emigrants have increased in number to any marked extent are Saran, Muzaffarpur and Champaran. All these districts lie in the densely populated tracts of North Bihar and it is not at all surprising that the additional strain imposed on the resources of the soil by the growth of population since 1921 has been in some measure relieved by a quickening of the stream of emigration."<sup>3</sup>"

### Sub-Himalayan Punjab

The population of this region increased by 14.6 per cent. during 1881-1931. The following are the percentages of growth.

		1931	1921	1911	1901	1891
Actual Population	...	+11.9	+0.7	-5.3	-1.4	+9.1

During 1881-1891 the population increased by 9.1 per cent. This decade was a period of excellent seasons and there were no epidemics. The region was recovering from the severe famine of 1877-78. The loss due to emigration from this tract amounted to 205,000 per-

1 Census Report, Bihar and Orissa, 1931, p. 31.

2 Census Report, Bihar and Orissa, 1931, p. 31.

3 Census Report, Bihar and Orissa, 1931, p. 32. No exact figures regarding the measure or the extent of this emigration are available. The above remark, therefore, should be accepted with caution.

sons.<sup>1</sup> The population decreased by 1·4 per cent. in the next decade. All the districts, except Rawalpindi, showed a decrease. Though malaria was prevalent in many parts of the region during this decade, the decrease was to be mainly attributed to the emigration of people from this region to other parts and especially to the Canal Colonies. On the balance of migration the region lost roughly 446 000 people. The actual number of emigrants to the Canal Colonies came to about 222,026.<sup>2</sup> "The decrease (in this region)", wrote the Census Superintendent of the Punjab in 1901, "is to be ascribed in part to the emigration to the Chenab Colony and if we 'put back' the numbers born in the districts which have contributed most to the numbers enumerated in the Colony we find that the decrease gives place to an increase in four out of six districts in question."<sup>3</sup>

The population recorded a decrease of 6·3 per cent. during 1901 — 1911. During the decade there were severe epidemics of plague and malaria. With the exception of Jhelam and Attock the whole tract lost heavily. In Hoshiarpur mortality from plague and fever amounted to 110,938 and 195,088 respectively. In Sialkot plague carried away 189,830 persons and another 237,215 succumbed to fevers. Emigration continued unabated and in some districts it was stimulated by plague. The loss from emigrations amounted to roughly 454,000 persons during this decade. The emigrants to Chenab Colony, from four districts of this region viz. Sialkot, Gurudaspur, Hoshiarpur and Gujarat, numbered 219,075.<sup>4</sup>

The epidemics of plague and malaria were more fatal to the female population of the province as a whole. In some cases the loss of population was entirely among the females. "The greatest decrease is in the period 10-15, in the group that is just entering the reproductive stage".<sup>5</sup>

During the next decade (1911-1921) the population increased by 0·7 per cent. which meant that it was practically stationary. As has been remarked earlier, the epidemics of the previous decade had depleted seriously the number of women. In the face of this, the population of this region could not be expected to show a rapid increase. But whatever recovery was made was nullified by the influenza epidemic which came in 1918-19. The epidemic took a heavy toll. This can be seen from the figures of death rate for some districts in this region.

1 Census Report, Punjab, 1901, p. 99, 100, 101.

2 Census Report, Punjab, 1901, p. 67.

3 Census Report, Punjab, 1901, p. 71.

4 Census Report, Punjab, 1911, p. 83.

5 Census Report, India, 1911, p. 74.

Death Rate from Influenza<sup>1</sup>

Amballa	...	44.4	Gujarat	...	39.8
Hoshiarpur	...	26.0	Jhelam	...	35.1
Gurudaspur	...	45.7	Rawalpindi	...	25.9
Sialkot	...	29.3	Attock	...	32.2

On the balance of migration the region lost 472,000 persons roughly.

In the last decade, 1921-1931, the population increased by 11.9 per cent. The decade was free from epidemics and the seasons were prosperous. The emigration to the Canal Colonies continued but with much less vigour. The total number of emigrants from Sub-Himalayan Punjab to the Canal Colonies amounted to about 104,515.<sup>2</sup>

## Indo-Gangetic Plain, East

The population of this region increased only by 1.6 per cent. during the fifty years, from 1881 to 1931. The following are the percentages of growth.

	1941	1931	1921	1911	1901	1891
Actual population	...	+16	+6	+0.5	-5.5	-7.1

The population increased by 5.1 per cent. during 1881-1891. This decade was a particularly prosperous one all over U. P. There were no epidemics and the agriculturists reaped good harvests. Some part of this growth could also be attributed to more correct and careful enumeration in 1891. During 1891-1901 the population decreased by 7.1 per cent. During the intercensal period there were two severe famines, one in 1896-97 and the other

1 Census Report, Punjab, 1921, p. 61.

2 Census Report, Punjab, 1931, p. 117

in 1899-1900. In this region, however, the decrease was not due to scarcity. Famine relief was only required in one district, Jaunpur. "Cholera is epidemic in all the districts included, but has not assumed the violent form it has elsewhere. The causes of the decrease are to be sought in the excessive rainfall in the earlier parts of the decade and emigration."<sup>1</sup> On the balance of migration the region lost roughly 521,000 persons.

The decade 1901-1911 recorded a decrease of 5·5 per cent. in the population. With the exception of Benares district this division had suffered most severely during the decade. "Its plague mortality was over 6 per mille and apart from this, it is the division from which emigration is most common."<sup>2</sup> The emigrants in this division exceed the immigrants by 435,000, to which some 50,000, at least should be added for overseas emigration. The greater part of this emigration (388,000) is directed to distant parts of other provinces."<sup>3</sup>

During 1911-1921 the population recorded an increase of 0·5 per cent. During this decade came the virulent influenza epidemic causing great loss of life. The effect of this epidemic could be best gauged by the number of deaths per 1,000 births in 1918, when the epidemic was at its worst. In that year there were 1879 deaths to every 1,000 births in the region as a whole. This loss was accentuated by the outflow of emigrants from this region. On the balance of migration it lost roughly 370,000 persons. "The Eastern Plain has suffered a net loss by emigration far greater than any other division in the Province."<sup>4</sup> In the last decade, 1921-1931, the population of the tract increased by 6 per cent. This decade was free from diseases, and the seasons were on the whole good. The increase of population was more marked in southern and eastern tahsils of this division. The efflux of people from the region continued and in 1931 the emigrants outnumbered the immigrants by more than two to one.<sup>5</sup>

<sup>1</sup> Census Report, N. W. Provinces and Oudh, 1901, p. 36. One wonders as to how "excessive rainfall" can decrease the population substantially!

<sup>2</sup> Census Report, United Provinces, 1904, p. 75.

<sup>3</sup> Census Report, United Provinces, 1911, p. 97.

<sup>4</sup> Census Report, United Provinces, 1921, p. 46.

<sup>5</sup> Census Report, United Provinces, 1931, p. 103.

## Indo-Gangetic Plain, Central

From 1881 to 1931 the population of this tract increased by 6.7 per cent. The following are the percentages of growth.

	1941	1931	1921	1911	1901	1891	1881
Actual population.	+14	+5.1	-4.1	-3.7	+1.3	+8.5	-0.8

The decrease of 0.8 per cent. recorded in 1881 was partly due to the famines during the preceding decade and partly to defective enumeration. In the decade 1881-91 the population of this tract increased by 8.5 per cent. The region was recovering from the famines of the preceding decade and there was also much improvement in enumeration. The decade was free from epidemics and the seasons were good. During the next decade, 1891-1901, the growth of the population was only 1.3 per cent. The draught of the year 1896-97 had played the chief part in keeping down growth. The increase of 4 per cent. in Cawnpore was the highest of all districts in this region. Cawnpore was not affected by draught and was well protected by canals. There was an influx of people in this district from Fatehpur and Bundelkhand. "In the three eastern districts of Oudh, Fyzabad, Sultanpur and Partapgarh, the migration to Assam and Bengal begins to affect the movement of population appreciably."<sup>1</sup> In addition to this Sultanpur and Partapgarh suffered severely from cholera. In 1900 the death-rate from cholera was 16 per mille in Partapgarh. On the balance of migration this region lost roughly 817,000 persons during the decade.

The population recorded a decrease of 3.7 per cent. during 1901-1911. "Malaria of 1908 did little damage, save in Hardoi and Lucknow and plague is the chief cause of mortality, coupled with famine, or rather, the increase in emigration which it caused."<sup>2</sup> The death rate from plague was 3.2 per mille. There was famine in 1907-1908. The *kharif* crop of 1907 yielded only 25 per cent. of its normal yield and the *rabi* crop of 1908 only 66 per cent. of its normal.<sup>3</sup> On the balance of migration this division lost roughly 252,000 persons during the decade.<sup>4</sup> The population decreased by 41 per cent. during 1911-21. In this decade the influenza epidemic of 1918 dominated the movement of population. "Central Plain

1 Census Report, N. W. Provinces and Oudh, 1901, p. 35.

2 Census Report, United Provinces, 1911, p. 73.<sup>2</sup>

3 Census Report, U. P., 1911, p. 40.

4 Census Report, U. P., 1911, p. 96.

suffered more from the influenza than any other division in the United Provinces."<sup>1</sup> The number of deaths per 1,000 births was 2140 in this region in 1918.<sup>2</sup> The efflux of emigrants continued and the region lost 236,000 persons on the balance of migration. In the next decade, 1921-1931, the population of the region increased by 5.1 per cent. "On the whole the Tahsils lying along the left bank of the Ganges (north), have, as a rule, increased substantially as also have the whole of Sitapur and three bordering Tahsils of Hardoi." Lucknow, Allahabad and Cawnpore have contributed to the increase by attracting immigrants to their cities. "On the balance of migration the division has lost 267,000 persons during the decade."<sup>3</sup>

#### Indo-Gangetic Plain, West

The population of this region increased by 10.2 per cent. during the fifty years, 1881-1931. The following are the percentages of growth.

	1941	1931	1921	1911	1901	1891	1881
Actual population.	+ 16	+ 6.7	- 5.6	- 2.0	+ 10	+ 1.5	- 2.1

The decrease of 2.1 per cent. in the population recorded in 1881 could be attributed to the famine and fever years of 1877-78 and 1879 respectively. In the next decade, 1881-1891, the population recorded an increase of 1.5 per cent. only. Enumeration was more efficient at this census. The seasons were good too and there were no epidemics. The cause of the slow growth must possibly be traced to the fever epidemic at the end of the previous decade, which had been more fatal to females, especially of the reproductive ages.

In the decade 1891-1901, the population recorded a growth of 10 per cent. "This division suffered neither from flood nor famine, and a large part of it prospered from the adversity of other regions."<sup>4</sup> The Doab districts were well protected by canals and were not affected by draught. Of the three Bundelkhand Division districts, Budaun escaped from floods and draught. Moradabad and Shahapur districts lost heavily. On the balance of migration the division lost roughly 935,000 persons. The population decreased by 2 per cent. in the next decade 1901-11. "During

1 Census Report, India, 1921, p. 37.

2 Census Report, United Provinces, 1921, p. 19.

3 Census Report, United Provinces, 1931, p. 90.

4 Census Report, N. W. Provinces and Oudh, 1901, p. 39.

this decade, came the plague and the malaria epidemics and the latter especially fell heavily on this region."<sup>1</sup> The plague mortality of this division had also been particularly high. The death rate from plague amounted to 3·7 per mile. All, but certain parts of Muzaffarnagar, Meerut, Aligarh, Etawah and Mianpuri, had lost heavily in the malaria epidemic of 1908.<sup>2</sup> On the balance of migration this division lost roughly 47,000 persons during the decade.<sup>3</sup>

The population decreased by 5·6 per cent. during 1911-1921. This decade saw the havoc of the influenza epidemic. This division suffered severely from the epidemic. In this region the number of deaths per 1,000 births in 1918 was 2,543. On the balance of migration this region lost roughly 144,000 persons during this decade.<sup>4</sup> In the decade, 1921-1931, there was an increase of 6·7 per cent. "Increase has been caused by two main factors (1) protection afforded to the western districts by canal water (2) the increasing industrialization of Aligarh, Agra and Moradabad. In the tracts unprotected by the canals or protected only by the lower or more unreliable reaches of canals, there has been little or no change. On the balance of migration the division has lost 458,000 persons in the decade."<sup>5</sup>

#### South Bihar

From 1881 to 1931, the population of this region increased by 9·2 per cent. The course of its increase has been zigzag. The following are the percentages of growth.

	1931	1921	1911	1901	1891	1881
Actual population	+12·4	-2·5	+0·7	-3·6	+2·7	+10·9

The increase of 10·9 per cent. recorded in 1881, was largely fictitious. Most of it was due to a more correct enumeration. Even in the next decade, during which the growth recorded was 2·7 per cent. a large part of the growth was to be attributed to more efficient enumeration. The growth was checked in that decade by the prevalence of fever in Gaya, Shahabad and Monghyr. There was also some loss due to emmigration, particularly in Gaya district. In the next decade, 1891-1901, the population decreased by 3·6 per cent. In all the districts of South Bihar plague was rampant during the decade. "The decrease is mainly attributed to direct

1 Census Report, India, 1911, p. 76.

2 Census Report, India, 1911, p. 73.

3 Census Report, India, p. 96.

4 Census Report, United Provinces, 1921, p. 46.

5 Census Report, United Provinces, 1931, p. 83.

and indirect losses caused by the epidemic e. g. heavy mortality and large scale emigration, and in some parts, the failure of the census staff to effect an exhaustive enumeration."<sup>1</sup>

During 1901 - 1911 the population increased by 0.7 per cent. The growth of population was checked by the failure of seasons and indifferent public health. Plague mortality amounted to 8.7 per mille. Emigration continued unabated. On the balance of migration the region lost roughly 361,000 persons during the decade. The influenza epidemic dominated the movement of population during 1911 - 1921. The population increased by 2.5 per cent. The loss was chiefly due to the ravages of influenza which fell heavily on the Province of Bihar as a whole in 1918-19. In the districts of Shahabad and Monghyr influenza mortality amounted to 103,000 and 98,000 respectively. The emigrants were also pouring out. On the balance of migration the region lost roughly 443,000 persons in the decade. This decade also witnessed a decrease in the proportion of women to men. The loss of the female population could not be explained by migration. The Census Superintendent of Bihar and Orissa for 1921 felt that the influenza epidemic was more fatal to the female population. In the last decade, 1921-31, the population increased by 12.4 per cent., the largest increase recorded in the census history of this region. The decade was free from epidemics and the seasons were on the whole good. A part of this increase was, however, due to the decrease in the number of emigrants. "In three districts out of four the outward flow of migration was temporarily reversed."<sup>3</sup>

### Konkan

In Konkan the population increased by 29 per cent. during 1801 and 1931. The following figures give the percentages of increase for every district.

Actual population	1931	1921	1911	1901	1891	1881 to 1931
Konkan ...	+ 7	+ 4	+ 7	+ 1	+ 8	+ 29
Bombay City ...	- 1.23	+ 20	+ 26	- 6	+ 6	+ 44
Thana & Bombay Suburbs ...	+ 11	+ 3	+ 9	- 1	+ 3	+ 40
Kanara ...	+ 4	- 7	- 5	+ 2	+ 6	- 1
Kolaba ...	+ 12	- 5	- 2	+ 2	+ 5	+ 12
Ratnagiri ...	+ 13	- 4	+ 3	+ 6	+ 11	+ 31

1 Census Report, United Provinces, 1931, p. 83.

2 Census Report, Bengal, 1901, p. 116.

3 Census Report, Bihar and Orissa, 1931, p. 40.

The decade 1881-1891 recorded a growth of 8 per cent. in the population of Konkan. All the districts recorded a fairly even growth. The decade was prosperous and there were no epidemics. The population increased by 1 per cent. only during 1891 and 1901. Bombay City and ( Thana ) Suburbs recorded a decrease of 6 and 1 per cent. respectively, while the other districts recorded only small increases. In 1896 plague appeared in Bombay. The decrease in the population of Bombay City and Suburbs was due to both mortality from plague and the heavy emigration to other parts. "It is not easy to decide how far the increase in the population of Kolaba district is due to the temporary exodus of labour from Bombay"<sup>1</sup>. Ratnagiri showed a good increase. Though the exact extent of increase due to the return of immigrants cannot be indicated, the moderate increases that the three districts of Kolaba, Ratnagiri and Kanara recorded, were largely due to the influx of population from Bombay City and Suburbs into these districts.

The decade 1901-1911 recorded a growth of 7 per cent. Excluding the City of Bombay, Konkan recorded an increase of only 2 per cent. The falling off in the population of Kolaba "is probably a complement to the increase in the Bombay City. It is now 12,000 persons short in foreign born,"<sup>2</sup> The drop in Kanara was due particularly to malaria, that was rampant in Supa Petha, and also to emigration to Belgaum and Dharwar districts. On the balance of migration the region lost roughly 215,000 persons during the decade. During 1911-1921 the increase recorded was 3 per cent. All of this was only confined to Bombay City and Suburbs. All the other districts recorded a decrease. This decrease was to be attributed to the epidemic of influenza. The total loss of population due to influenza amounted to 113,628<sup>3</sup>. During the last decade, 1921-1931, the population of this region increased by 7 per cent. The decade was a healthy one. The most important event that affected the movement of population was the coming of the world depression in 1929-30. Due to the adverse conditions caused by the industrial slump Bombay City could not attract more labourers. On the contrary it had to curtail the employment in the existing industrial units to meet the new situation. Bombay City had recorded a decrease. While the three districts except, Kanara showed a substantial increase. A large part of this increase was no doubt to be ascribed to the return of the emigrants from Bombay City.

<sup>1</sup> Census Report, Bombay, 1901, p. 33. The number of immigrants into the City of Bombay from Kolaba during the decade was less by only 6,000 persons than in the previous decade. The remark of the Census Superintendent should therefore, be taken with caution.

<sup>2</sup> Census Report, Bombay, 1911, p. 39

<sup>3</sup> Census Report, Bombay, 1921, p. 25

### Central India Plateau

During 1881 - 1931 the population of this tract declined by 0.2 per cent. "The population stands almost exactly where it did 50 years ago, due to heavy losses by famine in 1896-97 and from subsequent smaller famines and influenza".<sup>1</sup> The following are the percentages of growth.

	1941	1931	1921	1911	1901	1891
Actual population	+ 14	+ 8.7	- 6.5	+ 48	- 8.4	+ 2.2

The increase of 2.2 per cent., recorded during 1881-1891, was partly to be attributed to better enumeration. During 1891-1901 the population decreased by 8.4 per cent. The region suffered severely from the terrible famine of 1896-97. The proportion of people relieved to the total population reached the high figure of 42.13 per cent. in Banda and three of the districts had lost 10 per cent. of the total population. There were outbreaks of cholera in 1894, 1895 and 1896 which also affected these districts.<sup>2</sup> On the balance of migration the region gained roughly 28,000 persons during the decade.

In the next decade the population recorded a growth of 4.8 per cent. "There has been next to no plague in this division and no epidemic malaria at all. The very rapid growth of population in this decade is in part due to the large proportion of persons at the reproductive ages, which were found at the beginning of the decade."<sup>3</sup> Since 1901 there were two famines but the population withstood them well. On the balance of migration the division lost more than 2,000 persons during the decade.<sup>4</sup> During 1911 - 1921 the population decreased by 6.5 per cent. There was scarcity and famine in the year 1913-14. In 1918 came the influenza epidemic. The number of deaths per 1,000 births in 1918 was 2,023, in this region. On the balance of migration this region lost nearly 71,000 persons during the decade.<sup>5</sup> In the decade 1921-1931 the population increased by 8.7 per cent. The seasons were on the whole fair and the decade was also free from any epidemics. The increases occurred in the southern and south-western areas of the tract. On the balance of migration it gained 9,000 persons during the decade.<sup>6</sup>

<sup>1</sup> Census Report, United Provinces, 1931, p. 93

<sup>2</sup> Census Report, N. W. Provinces and Oudh, 1901, p. 35

<sup>3</sup> Census Report, United Provinces, 1911, p. 74

<sup>4</sup> Census Report, United Provinces, 1911, p. 97

<sup>5</sup> Census Report, United Provinces, 1928, p. 46

<sup>6</sup> Census Report, United Provinces, 1931, p. 94

## CHAPTER IV

### Regions in Retrospect

#### *Part I : Typical Regional Groups*

In the preceding pages various regions have been described in detail and their population histories between 1881 and 1931 have been set down. In this chapter all the loose threads are picked up and woven into a sort of a retrospective pattern. There are in all twenty-two regions under consideration. They exhibit various stages of economic development, different kinds of population-movement-patterns, strange growths, declines and oscillations. It is necessary to divide them into groups which can serve as basis for retrospective analysis. In this publication these various regions have been grouped according to their population growths as recorded during 1881-1931. Broadly they fall into four groups:

(I) Very-Rapidly-Growing-Regions-Group : This consists of regions that have recorded a population growth of 60 per cent. or more during 1881-1931 : 7 regions fall into this group.

(II) Fast-Growing-Regions-Group : This includes regions that have recorded population growths between 20 per cent. and 45 per cent. during 1881-1931 : 4 regions comprise this group.

(III) Very-Slowly-Growing-Regions-Group : This is composed of regions that have recorded population growths between 10 per cent. and 16 per cent. during 1881-1931 : 5 regions constitute this group.

(IV) Stagnant-and-Declining-Regions-Group : This group covers those regions that have registered population growths below 10 per cent. and those that have recorded decreases during 1881-1931 : 7 regions come under this category.

These groups are formed on a purely arbitrary basis. It will be seen, however, that these various groups do present typical population patterns.

As is obvious, the population study of these regional groups is confined to the period 1881-1931. The economic development and the population of all regions, as it was in 1881, is the given starting point. The given population and economic development in 1881 is, of course, historically determined. The growth or decline of popu-

lation and the economic development in a region must be considered in this context. The population histories of various regions during 1881-1931, set down in Chapter III, show the relation of growth or decline of population to the growth or decline of economic opportunities in various regions. In considering each region, therefore, two things must be specially considered. First, the leeway left at the old stage of economic and technical development in 1881 and second, the difference made by technical innovations during the period under consideration (1881-1931). These two considerations together should give a proper picture of the whole process.

*Group I* includes the following Regions. (1) Cochin, (2) Travancore, (3) East Bengal, (4) Chota Nagpur Plateau, (5) Sind, (6) North-West Dry Area, Punjab, and (7) Brahmaputra Valley. From the point of view of economic development Cochin, Travancore and East Bengal are older regions, in the sense that in all of them the process of land settlement was far advanced, even in 1881. The leeway left to be made up at that stage of technical arts was small.

During the period 1881-1931, all the regions underwent changes of far-reaching significance. In most of them new technical factors came to be introduced. In Cochin and Travancore this period witnessed the growth of the tea, coffee, rubber, and cardamom plantations. There was also a growth of industries, such as that of cocoanut oil pressing and coir manufacture. In East Bengal the important factor was the development and growth of the jute crop. During this period jute mills sprang up and the demand for jute increased considerably. It should be also kept in mind that this crop is practically the monopoly of Bengal and most of this crop is produced in East Bengal. In East Bengal there was also a considerable increase in the double cropped area. The other regions were undeveloped tracts in 1881. Chota Nagpur Plateau and Brahmaputra Valley were practically virgin regions due to their physical configuration and the lack of transport facilities. The North-West Dry Area, Punjab, was practically a desert due to the absence of canal irrigation in 1881. Even by the technical standards of 1881 this region was undeveloped and the leeway to be made up was even then great. In Sind, the conditions were rather different. Irrigation on the Indus dated from very early times. In 1881 the old canals were working. The scope for the extension of canal irrigation was, however, very large even then.

During the period 1881-1931 these regions developed very rapidly not only because they were previously undeveloped but

because of the introduction of new technical factors. In the North-West Dry Area, Punjab, great works of canal irrigation were undertaken and completed. In this region canal irrigation revolutionised life and agriculture. During the same period the efficiency of the existing canal irrigation in Sind was considerably increased. Throughout the period the extension of canals continued unabated till the Sukkur Barrage Project was taken up. In the Brahmaputra Valley tea plantations came to be started and developed during the same period. There were some minerals in this region whose workings were also started. This was accompanied by a gradual settlement of waste land that was plentiful. In the Chota Nagpur Plateau, coal mines were developed during this period and the aboriginal tribes came more and more to practise settled agriculture. The waste land came to be settled and this, was aided by the development of roads and communications. One feature is common to all the regions included in this group, except perhaps the Chota Nagpur Plateau. In most of them due to a security of natural or artificial agricultural water supply famines are unknown or at least very rare.

All these regions record very rapid growths of population during 1881-1931. Except, in Sind and the Chota Nagpur Plateau, the growth of population in all the regions is more than 100 per cent. The graphs of their growths are not, however, all alike. The graphs of population growths in Cochin, Travancore, Brahmaputra Valley, N. W. Dry Area, Punjab and those of East Bengal, broadly speaking, rise evenly and show a continuous growth. The population growth curve of Sind rises fairly evenly but there is a big downward loop in 1921. In contrast to all of them the population growth curve of the Chota Nagpur Plateau rises unevenly and is oscillating.

When the nature of population growths in the various regions in this group is examined they fall into two distinct sub-groups. The first, consisting of those regions in which the population growth during 1881-1931 had been mostly natural i. e. due to an excess of births over deaths; and the second, consisting of regions where the population growth during 1881-1931 had been mostly the result of an excess of immigrants over emigrants or a favourable balance of migration. The first sub-group includes five regions; Cochin, Travancore, East Bengal, the Chota Nagpur Plateau and Sind. The second sub-group includes two regions, N. W. Dry Area, Punjab and the Brahmaputra Valley. These sub-groups are of course very broad. For in the first sub-group there are some regions like Sind

and Travancore which have gained, somewhat by immigration but there are also others like Chota Nagpur, and East Bengal which have lost through emigration during 1881-1931. In spite of this the basis of their rapid growth remains a good survival rate. An examination of fertility and mortality conditions in the first sub-group throws important slants on the movement population in these regions.

Take fertility first. The results of the fertility inquiry of 1931 are available in the case of three of the regions of the first sub-group. They are as follows :—

	No. of children born per family.	No. of children surviving per family.
Cochin	3.76	2.76
Travancore*	6.5	4.9
East Bengal	5.8	3.9

From these figures it is clear that Travancore has the highest fertility and survival rates of children per family. The fertility rate of East Bengal is very near it, but the survival rate of children in it is smaller. In Cochin, however, both the rates are smaller. Further refinements of the available data bring out Travancore's lead over Cochin. In Travancore the net reproduction rate comes to 1.8 nearly.<sup>1</sup> The results of the fertility inquiry recently (1937) conducted in Cochin shows that the general fertility rate of Cochin is much smaller than that of Travancore, nearly one half of the

1 The true rate of natural increase for Travancore in 1931, as calculated in the last chapter, was +0.02299 per head per year. How high this rate is can only be realised by comparing it with the true rate of natural increase for Australia in 1932-34 which was—0.00159 per head per year. The true rate of natural increase is the annual rate of growth of population subject to constant conditions of fertility and mortality. This rate is not, therefore, a static magnitude but only a particular point in a moving curve. Any attempt, therefore, to check the correctness of the Travancore rate by calculating from it the population of Travancore in 1941 is incorrect. Dr. Lotka observes : "Throughout the history of a population growing according to the logistic, the true or the inherent rate of natural increase falls systematically below the excess of birth-rate over the death-rate, but these quantities approach each other more and more as we pass either to the right or to the extreme left of the diagram." "The Structure of A Growing Population" in "Problems of Population" Ed. Pitt-Rivers, 1932, p. 280.

latter. The net reproduction rate of Cochin, therefore, cannot be much above unity. This is again confirmed if the population statistics of Cochin are examined according to the simple method suggested by Prof. C. Gini.<sup>1</sup> According to this calculation the rate required to replace the population of Cochin in 1931 came to 1.398 while the actual rate that obtained in that year was 1.437, not much above the required minimum.

In the case of Sind and the Chota Nagpur Plateau such data are not available. The Census Superintendent of Bihar and Orissa for 1931, however, remarked that the survival rate of children in the Chota Nagpur Plateau was considerable<sup>2</sup>. The aboriginal tribes of Chota Nagpur show a greater fertility though the expectation of life in these tribes is very low. The causes of this high fertility are discussed later on.<sup>3</sup>

Examination of the mortality conditions in all the regions of this sub-group shows that they are naturally healthy tracts. Famines being rare, the age compositions of their populations have not suffered adversely because of severe famine mortalities. Three of them, East Bengal, Sind and the Chota Nagpur Plateau, suffered heavily from influenza in 1918. This epidemic did not appear in Cochin and Travancore.

The second sub-group is composed of the two remaining regions—the N. W. Dry Area, Punjab and the Brahmaputra Valley. In both these regions the growth of population during 1881–1931 is mostly attributable to a favourable balance of migration and the conditions of fertility and mortality play only a minor rôle.

<sup>1</sup> Professor Gini's method is as follows : Take the number of females shown by the census returns to be between the ages of twenty and thirty and compare it with the annual average number of female births during the last years for which data are available. If we divide the first number by the second multiplied by ten we get the percentage of survivors there should be from present births in order to secure in twenty or thirty years' time numbers equal to those returned by the last census. Comparing these co-efficients with those of the latest life-tables we can find the effective and the required survival rate of the population. "Population," Harris Foundation Lectures, 1929, p. 66 and pp. 82–84.

<sup>2</sup> Census Report, Bihar and Orissa, 1931, p. 123.

<sup>3</sup> In connection with the Chota Nagpur Plateau an interesting point needs mention. An investigation into "The Differential Fertility in England and Wales" by Enid Charles and Pearl Moshinsky showed that "The mining and the metal industries, and to a somewhat less degree agriculture, are associated with relative high fertility"—Political Arithmetic, 1938, p. 160. It is well-known that the Chota Nagpur Plateau is the home of mining industry in India.

N. W. Dry Area, Punjab, showed an increase in population till 1921 due to a favourable balance of migration, but during the last decade 1921-1931 a larger part of the growth was natural. The balance of immigration over emigration, in this region, became progressively smaller roughly from 1901. In the case of Brahmaputra Valley, though exact figures are lacking, it might be said that a large part of its growth till 1921 was due to a favourable migration balance and this balance was becoming smaller and smaller with every succeeding census. The growth recorded in the last decade 1921-1931 was largely natural.

Such a phenomenon is not altogether new or surprising. Here an analogy from the United States comes in very handy. In the United States "the migration history of prevailing agricultural areas seems to follow a uniform pattern. About three decades after the first settlement, the population surplus reaches a maximum, and after about three decades, a decreasing surplus, a deficit is established. This pattern can be seen in any state whose settlement history is complete in the period represented."<sup>1</sup> Both regions under consideration have not yet completed their settlement history. But they have shown a broad uniformity with the above pattern up till now. Both the regions suffer somewhat from malaria, N. W. Dry, Punjab because of canals and Brahmaputra Valley because of excessive rain fall. Influenza mortality was heavy in the former in 1918. Kala Azar is the bane of the latter, though it has been brought under control of late.

*Group II* consists of four regions. They are : (1) East Coast Madras, North, (2) East Coast Madras, South, (3) Bombay Deccan and (4) Surma Valley. All these regions record population growths between 20 per cent. and 45 per cent. during 1881-1931. If the Konkan, including Bombay City, is considered its population growth during 1881-1931 amounts to 29 per cent. and it falls in this group. But if Bombay City is excluded the growth during 1881-1931 comes to only about 9 per cent. Konkan excluding the Bombay City is therefore included in the last group as conforming more to that type.

Except Surma Valley, all the other regions in this group are comparatively older regions. It should be remembered, however,

<sup>1</sup> Internal Migrations in U. S. A., C. Warren Thornwaite, Philadelphia, The University of Pennsylvania Press, 1934. p. 10.

that the plain of Sylhet, which constitutes the greater part of Surma Valley, was the oldest inhabited and settled region in the whole of Assam. In the East Coast Madras, North, the major works of canal irrigation on the Kitsna and the Godavari were complete and were already working in 1881<sup>1</sup>. During the period 1881-1931 minor irrigation projects were carried out and the existing works were further developed. By increasing their efficiency their possibilities were further explored. In the East Coast Madras, South, the conditions were quite different. The resources of this region were proving inadequate to stand the strain of growing numbers, even some fifty years before 1881, as can be distinctly seen from the continued emigration of its people to distant lands even in the thirties of the 19th century. In 1881, therefore, the region was displaying signs of the growing strain on its resources. During 1881-1931, however, the Periyar Canal and the Cauvery Canals were constructed bringing under cultivation much waste land. Whatever leeway was left in 1881 has perhaps been made up by now.

The Bombay Deccan in 1881 presents the picture of a permanent famine tract as it is even to-day, though to a somewhat less degree. Its insecure agriculture needs artificial irrigation and most of the canals in this region were constructed during the period 1881-1931. The canals, however, affect a small part of the tract and have not very much affected its liability to famine. The Surma Valley was comparatively an undeveloped tract in 1881 and the process of land settlement in it was not yet complete, though it was well advanced. This was mostly due to a lack of communications. During 1881-1931 this region witnessed the development of roads and railways. The tea plantations and some mining operations were started and developed during the same period. The process of land settlement also made rapid progress.

All the regions have displayed fairly fast population growths during 1881-1931. The growth curves of the East Coast Madras North and South, show a fairly even increase throughout, though the curve of the former shows a small downward loop in 1921. The growth curve of Surma Valley is uneven and oscillating while

1 A very important point regarding canal irrigation must be borne in mind. The full effects of canal irrigation manifest themselves after a time lag of about 20 to 30 years. Therefore even if in some of the regions the canals were constructed before 1880 their effects became manifest during the period 1881-1931.

that of Bombay Deccan is the most erratic and shows large oscillations, sharp rises and falls in alternate decades.

This group can also be divided into two sub-groups; first sub-group consisting of regions where the population growth during 1881-1931 was mostly due to a favourable balance of births and deaths and the second, consisting of regions in which it was mostly due to a favourable balance of migration. The first sub-group will include then, three regions: East Coast Madras, North, East Coast Madras, South, and Bombay Deccan. The second sub-group will include only one region, the Surma Valley.

In all the regions of the first group rainfall is scanty and insecure. In two regions, however, East Coast Madras, North and South, agriculture is secure to a considerable extent due to the existence of large scale canal irrigation. In these two regions consequently canal irrigation dominates life and population growth completely. In the remaining one, Bombay Deccan, famine is always a haunting spectre. In none of them is double-cropping important. In the East Coast Madras, North, rice is an important crop. But it is not so in the other two. The other two grow cotton. East Coast Madras, North and Bombay Deccan grow tobacco also.

Two of the regions in the first sub-group, East Coast Madras, North and South, lose heavily on the balance of migration, the latter especially so. In the latter emigration has kept the birth-rate at a lower level. In the Bombay Deccan the growth would have been much larger but for the heavy mortality of famines and epidemics. The fertility inquiry of 1931 revealed that 404 children were born per family in the Bombay Deccan out of which 271 survived. This is a fairly high rate. It only underlines the fact that mortality is the decisive factor in the movement of population in the Bombay Deccan. In all the regions of this sub-group the influenza mortality was heavy, particularly in the Bombay Deccan.

Coming to the other sub-group, consisting of the Surma Valley, it must be said that the line of distinction between the two sub-groups is not so sharp in this group as in *Group I*. The Surma Valley enjoys an unfailing rainfall and therefore famines are unknown in it. Rice is the main crop and tea plantations are an important asset of this region. In Surma Valley the immigrants are mostly attracted by the prospect of employment on the tea plantations and to a less degree by the prospect of settling on waste land. Since 1921 the Surma

Valley has been losing slightly on the balance of migration. The growth of population in this region, between 1911 and 1931, is mostly natural. It is doubtful whether the analogy of a "frontier" applies to this region. The data at hand are not sufficient to indicate any definite conclusion. The history of the last two decades shows that migration is no longer adding anything positive to the population of this tract. The Surma Valley suffered a heavy loss from Kala Azar in 1917. Some parts in it are notoriously malarious.

*Group III* consists of five regions. They are : (1) Gujarat, (2) Orissa, (3) West Bengal, (4) North Bihar and (5) Sub-Himalayan Punjab.

All the regions included in this group are older regions. They were well developed in 1881 and the leeway, left to be made up at that stage of arts, was in most of them little and in some practically nil. The Orissa Canals were almost complete before 1881. During 1881-1931 some significant developments took place in some of these regions. The textile industry developed in Gujarat, in and around Ahmedabad. In sub-Himalayan Punjab there was a considerable development of well-irrigation during the period. The area under indigo was completely absorbed by other crops in North Bihar during this period. Though the coal and iron mines in West Bengal were being worked scientifically before 1881, during 1881-1931, the efficiency and the scope of their working was considerably increased. There was also the growth of jute mills in the Howrah and the Hughli districts of that tract. In Orissa the canal construction was completed during this period.

In all the regions in this group there is a comparative security of agriculture. In Gujarat a degree of commercialization of agriculture is noticeable in the growth of the cotton crop. Orissa is solely dependent on the rice crop. In North Bihar and West Bengal double cropping has assumed great importance and to a less extent in Sub-Himalayan Punjab. In others its significance is much less. In North Bihar, Orissa, West Bengal rice is the principal crop. Sub-Himalayan Punjab is a wheat region. Jowar is an important crop in Gujarat. Both Gujarat and Sub-Himalayan Punjab grow commercial crops; cotton in the former and groundnuts in the latter.

Sub-Himalayan Punjab and North Bihar, lose heavily on the balance of migration. Orissa does so to a less extent and Gujarat to a still smaller extent. Emigration from Sub-Himalayan Punjab is mostly to the Canal Colonies and it is of a permanent character.

This loss is becoming less and less with every census. Emigration from other regions is of a temporary character. The volume of such emigration is increasing, year after year, in the case of North Bihar, while it is diminishing in the case of Orissa. In contrast to all these regions West Bengal gains on the balance of migration.

All these regions record population growths between 10 per cent. and 16 per cent. during 1881-1931. The growth curves of all the regions show uneven growths and are oscillating in character. The loss through emigration has kept down growth in some of the regions. The influenza mortality in 1918 was heavy in all the regions. The mortality from famine was particularly heavy in Gujarat, in 1896. This must have affected its age composition quite unfavourably. In Sub-Himalayan Punjab there was considerable mortality during 1901-1911 due to both, plague and malaria. In Orissa the birth-rate has been consistently low and the mortality at the exposed periods of life has been heavy throughout, because of bad agricultural conditions.<sup>1</sup>

It should be noted in the case of West Bengal that the growth of population in it is mostly due to a favourable balance of migration. But even that growth is not much being only 13.71 during 1872-1931. Whatever growth has taken place has been mostly confined to the metropolitan areas. Otherwise it is a stagnant tract. West Bengal, therefore, more fittingly belongs to the group of stagnant-and-declining regions. It has been therefore included in that group.

*Group IV* consists of seven regions. They are : (1) Indo-Gangetic Plain, Central, (2) Indo-Gangetic Plain, West, (3) Indo-Gangetic Plain, East, (4) Central India Plateau, (5) South Bihar, (6) West Bengal and (7) Konkan (excluding Bombay City). They record population growths below 10 per cent. and a decrease in one region during 1881-1931.

All the regions included in this group, are very old centres of civilisation in India. They have been centres of population from historical times. In 1881 most of these regions were well developed. The leeway left to be made up at that stage of arts was almost nil in all these regions. During 1881-1931 there were technical innovations in some. Some canal construction took place in Central India Plateau and Indo-Gangetic Plain, Central during that period. There was a considerable development of well irrigation in Indo-Gangetic Plains, Central and

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1 Census Report, Bihar and Orissa, 1931, p. 123.

Eastern. In the Indo-Gangetic Plains, Western, Central and Eastern, there was a large growth in the double cropped area accompanied by a decline in the area cultivated in the first two. Of late the double cropped area in all the three regions shows a decline.

In all these regions, except Konkan, vagaries of rainfall are common. In some there is uneven distribution of rainfall, as in Central India Plateau and Indo-Gangetic Plain, West and South Bihar. In some there is water logging, as in West Bengal and Indo-Gangetic Plain, East, and Indo-Gangetic Plain, Central. In the Konkan rainfall is heavy and regular but the poorness of the soil is proverbial.

If Central India Plateau and Konkan are excluded, all the regions fall in what is called the Indo-Gangetic Plain of India. More precisely they constitute the major part of the Ganges Valley. The three regions Indo-Gangetic Plains, Western, Central and Eastern, constitute the Upper Ganges Valley. The strain of growing numbers on the resources of this tract has resulted in a general deterioration. Some of the symptoms of such deterioration are common to all the regions of the Upper Ganges Valley. Professor Radha Kamal Mukerjee gives them concretely. The scope for the extension of cultivation is exhausted throughout. The increase of density of population has outstripped the net cultivated area. An extensive double cropping is practised throughout and it is a sign of reckless agriculture which has been forced on the peasants.<sup>1</sup> Heavy yielding crops of inferior variety are replacing the existing crops to stave off population pressure. The size of peasants' holdings has become uneconomic throughout. Intensive farming and irrigation facilities have nearly reached their limits. The volume of emigration corresponds to the condition of the harvests. The vicissitudes of agriculture affect very comprehensively the whole fabric of man's life in these regions. Crop conditions

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<sup>1</sup> Whether an extensive double-cropping amounts to reckless agriculture is a doubtful point. Due to the pressure of population the margin of cultivation has extended to poorer lands. Whatever little that can be got by resorting to double-cropping has been brought within the economic margin by the pressure of population. If the peasant resorts to double cropping under such circumstances it falls strictly into the category of 'economic behaviour'. The question of the deterioration of the soil due to extensive double cropping does not arise, as there is a limit below which there cannot be any further deterioration. This point has been reached in the case of the Indian soils especially those of the Ganges Valley.— See Agricultural Commission's Report, p. 74.

measure the health, vitality and the efficiency of the people.<sup>1</sup> It would appear from the movement of birth and death rates of Muttra, Aligarh, Etah (Indo-Gangetic Plain, West) that there is a tendency of mortality to be increasingly higher than natality<sup>2</sup>. This reminds one of Dr. Raymond Pearl's Law that when population density reaches an equilibrium point the death-rate exceeds the birth-rate and there is a decline of population until equilibrium is restored.

In South Bihar migration is spasmodic and responds to crop conditions. In South Bihar and Central India Plateau, heavy mortality from epidemics has kept the population growth low. In West Bengal the prevalence of malaria has affected the vitality of the population, making it more liable to disease and has consequently increased the death-rate. In Konkan the birth-rate has been affected by the continued migration of a large percentage of the male population to Bombay City.

The curves of population growths of the regions of the Upper Ganges Valley show curious oscillations. The growth curve of West Bengal is also oscillating. The curve of South Bihar is very uneven and shows sharp rises and falls, while that of the Central India Plateau is most erratic and shows large fluctuations in alternate decades. The growth curve of Konkan is almost a parallel straight line till 1911. Then there is a big fall in 1921 and a big rise in 1931.

Two regions in this group, West Bengal and the Central India Plateau, are particularly unhealthy. The Indo-Gangetic Plain, East, is particularly liable to cholera. In all the regions of this group the influenza mortality in 1918 was heavy. In all the regions, except West Bengal, plague mortality during 1901-10 was heavy. Excluding West Bengal, Konkan and South Bihar, the other regions also suffered heavily from the malaria epidemic of 1908. The famine of 1897-98 was particularly severe in Central India Plateau, and the Indo-Gangetic Plains, Central and Eastern.

Except in the Indo-Gangetic Plain, West and the Central India Plateau, rice is the main crop. The dependence of South Bihar on winter rice increases its agricultural insecurity. In the Indo-

<sup>1</sup> Regional Balance of Man; Prof. R. K. Mukerjee, 1938, p. 210.

<sup>2</sup> *Ibid.*, p. 170

Gangetic Plain, West, wheat is the main crop. In the Central India Plateau wheat is not an important crop. Jowar and Bajra are the staples of that region.

The Konkan, Indo-Gangetic Plain, East and South Bihar, lose on the balance of migration. Indo-Gangetic Plain Central does so to a less extent, and the Western Plain to a still smaller degree. Central India Plateau had gained slightly on the balance, during 1881-1931.

There can be another interesting cross classification of regions. This group consists of regions that show most erratic growth curves, rising and falling sharply in alternate decades. Such regions are three, Bombay Deccan, Central India Plateau, and South Bihar. The growth curves of these three are strangely alike. In all these three regions agricultural insecurity of a high degree, due to a lack of sufficient and well distributed rainfall exists. In all of them the possibilities of the extension of canal irrigation are almost exhausted, or at least not much of canal construction has taken place. The difficulties in the way of the construction of wells are also great in all of them. The soils of these regions are comparatively poor and double cropping is of least importance in any of them. The decline of population during 1891-1901, which all of them share, was due to excessive famine mortality in the Central India Plateau and the Bombay Deccan. In South Bihar, though famine was not present, the plague epidemic was responsible for the loss, directly by increasing mortality and indirectly by encouraging emigration. The other decline of population, between 1911-1921, shared by all three was solely to be attributed to the ravages of influenza in all the three regions. South Bihar loses on the balance of migration. Bombay Deccan does so to a less extent while Central India Plateau does actually gain slightly on that balance. In South Bihar emigration affects and reduces fertility. The mortality caused by the famine of 1897-98 affected very unfavourably the age composition of its population and its effects were aggravated by subsequent famines and epidemics. Bombay Deccan also suffered heavily in that famine and its age composition was also unfavourably affected. Rice is an important crop in South Bihar. The other two regions grow jowar and bajra as staples. Central Indian Plateau, however, does not grow any commercial crop. Bombay Deccan grows tobacco and cotton.

## CHAPTER V

### Regions in Retrospect

#### *Part II. General Observations*

After a thorough study of the material presented in the preceding pages one obvious conclusion suggests itself; that the movement of population in a region is dependent on the industrial and agricultural possibilities of that region. In the last analysis, any population depends upon its natural environment for the means of its subsistence. External nature provides the resources for man's economic life and sets limits to the scope of his accomplishments. The facts of the physical environment assume greater importance in a predominantly agricultural country like India. It is an accepted ecological law that "the dependence of living creatures on climate and other physical conditions is greatest where the natural environment is most unfavourable, and where the multiplication of number has made the struggle for existence most acute."<sup>1</sup> The favourableness or the unfavourableness of natural environment plays a decisive part in the movement of populations. Man is a very vital part of the organisation of life in a region and his success in adapting and struggling with his environment is expressed in terms of growth or decline. This has been found to be generally true in our data. In areas in which economic opportunities are relatively great the natural increase of population has been relatively large as in Travancore, Cochin and East Bengal, while, in the areas in which these are relatively small the natural increase of numbers has also tended to be small as in South Bihar, Indo-Gangetic Plain, Central and Central India Plateau.

It is not, however, suggested that the growth or decline of population in a region serves as an index to the prosperity or adversity of that region. Even though the growth of population during 1881-1931 in the Bombay Deccan or East Coast Madras, North, is greater than that of Gujarat or North Bihar or Sub-Himalayan Punjab, it will be absurd to suggest that the latter regions are less prosperous than the former ones. The movement of population is affected by social as well as economic factors. It responds to both the natural and the man-made

1 The Regional Balance of Man, Prof. Radha Kamal Mukerjee, 1938, p. 136.

environment. Man is a conscious agent adapting himself to environment and at the same time changing it to his needs. "All the achievements and acquisitions of past human associations that have been transmitted to the given group enter actively into its process of living. Social phenomena, therefore, must be viewed as the results of multiple causes, functionally interrelated. The external factors of the physical environment impose limits, set conditions of adaptation, and provide potential resources, but racial and cultural factors enter dynamically into the results."<sup>1</sup>

The general conclusion was emphasised by another fact that was observed. Changes in numbers, and distribution of population in a given region over several years often present important clues regarding the economic resources and other assets and liabilities of that region. The population histories of the North-West Dry Area, Punjab, Sind and the Brahmaputra Valley clearly bring out the significance of the above statement. In the North-West Dry Area, Punjab and Sind the curve of population growth has closely followed the development and growth of the vast irrigation projects of those regions. The development of tea plantations and the process of land settlement in the Brahmaputra Valley is amply reflected in its population growth. These are random examples that meet the eye at the first glance. But the same can be said of almost all the regions studied here.

The density of population in a region definitely furnishes a clue to its environment, natural as well as man-made. Density expresses in a simple way the prevailing man-land ratio in a region. The usefulness of density as an "economic concept" has been disputed. In predominantly agricultural regions, however, density of population does not only express a mathematical formula. It signifies "the economic relationship subsisting between the population and the area over which it is concentrated."<sup>2</sup> Density is generally a function of the economic opportunities to be found in a region, under prevailing conditions. An increase in the economic opportunities in a region is generally followed by an increase in its density and *vice versa*. The state of economic opportunities in a region depends upon its own state of agricultural and industrial development. The extension of agriculture achieved

<sup>1</sup> People of Kansas, Clark and Roberts, Kansas State Planning Board, 1936.

<sup>2</sup> Trends of Population and Agriculture in the Ganges Valley, Dr. B. N. Ganguli, 1938; p. ix.

through the construction of canals in the North-West Dry Area; Punjab, and Sind were followed by appreciable increases of densities in both the regions. So also the industrial development in Travancore and the Chota Nagpur Plateau caused a rise in their respective densities.

The correlations of density with the extension of cultivation, double-cropping, etc. in different regions are, however, peculiar in every different region. In the Gangetic Plain generally, density is correlated with the extent of double cropping. In East Coast Madras, North it is linked with the extent of irrigation. Taking all these facts into consideration, I think that Dr. B. N. Ganguli has put the position correctly thus : "Rural density in the crowded monsoon zone supplies an invaluable index of economic exploitation on the one hand, and the ensemble of natural agricultural advantages on the other. It is seen to vary with such distinct factors as extension of cultivation and intensive subsistence farming, which again have definite correlation with geographical and ecological factors, viz. fertility and the amount and distribution of agricultural water-supply."<sup>1</sup> High density in different regions was nearly always accompanied by the predominance of the rice crop. North Bihar, Cochin, West Bengal, Indo-Gangetic Plain, East and many other regions illustrate this contention. In certain regions such as Travancore, Cochin, East Bengal cocoanut palm, in addition to rice, has accompanied very high densities.

The data of the preceding pages indicated no correlation between the density and the growth of population in a region. Dr. Raymond Pearl has observed : "In the direct and indirect biological effects of density of population upon reproduction exists one *vera causa* for the damping of the growth of population as the upper limit of the logistic curve is approached."<sup>2</sup> It is difficult to say whether, all the conditions necessary for Pearl's law to become operative are present in any of the regions except probably in some districts of the Indo-Gangetic Plain, West, as noted in the last chapter. It was, however, observed that population had shown a very rapid growth in some areas with very high densities like East Bengal and Travancore. In some others, also of high density, the population had recorded a slower growth, as in North Bihar and Indo-Gangetic Plain, Central. Regions of low densities have shown very

1 Dr. Ganguli Op. cit, p. V.

2 Biology of Population Growth, Dr. Raymond Pearl, 1925, p. 155

rapid population growths as in Sind and Chota Nagpur Plateau, and a fairly rapid growth in Bombay Deccan. As it is difficult to say, whether the pre-requisites of Pearl's law are definitely operative in any of the regions, nothing in this has perhaps a bearing upon the validity or otherwise of that law!

High density in a region does not necessarily indicate over-population. Each region, under the given conditions of arts and agriculture, has a more or less definite population capacity and an "expansion ratio", to use Rousseau's phrase, i. e. the percentage which the present population bears to the maximum population the area can support.<sup>1</sup> A region with a high density like East Bengal and Travancore may still be under-populated while regions with very low densities, like the districts of Dera Ismail Khan and Muzaffergarh in the N. W. Dry Area, Punjab, may show signs of over-population. "Density, by itself, therefore cannot be taken as an index of over or under-population."<sup>2</sup>

It has been said that "the principal problem of a region as a whole, grows out of an excess of population in relation to economic opportunities to be found there under prevailing conditions."<sup>3</sup> The strain of growing numbers in a region can be relieved by further developing its agriculture and industries and thus increasing the volume of economic opportunities in it. Emigration of people from a region is another way of relieving population pressure. Where a region is unable to offer good prospects to its strong and ambitious youth they seek better openings in cities or in other localities. On the other hand, a region by increasing the volume of economic opportunities to be found in it, relatively more to its own numbers, attracts people from without.<sup>4</sup> Migratory movements have thus an equalising effect on population relative to economic opportunity in different regions.<sup>5</sup> Fluidity in the

<sup>1</sup> Rousseau, "The Geographical Study of Population Groups", *Geographical Review*, XIII, April, 1923.

<sup>2</sup> Sociology of Population, Prof. Binoy Kumar Sarkar, 1936, pp. 28, 29. Also Dr. Raymond Pearl, "War and Overpopulation", *Current History*, March, 1936.

<sup>3</sup> Economic and Social Problems and Conditions of the Southern Appalachians, Miscellaneous Publications No. 205, U. S. Department of Agriculture, p. 5.

<sup>4</sup> This should be modified in the case of a people like the Bengalis who do not man their home industries.

<sup>5</sup> Cf. Raja, K. C. K. E., "Probable Trend of Population Growth in India" *Indian Journal of Medieval Research*, July, 1935.

movements of population is an indispensable means of adjusting the various economic enterprises of a nation, balancing the scales of opportunity and maintaining the social equilibrium.

The question, whether the migratory movements of population are mainly caused by economic factors, is very often posed. One answer to this question has challenged the validity or efficacy of the economic causation of migratory movements. The Census Superintendent of Madras, in 1931, has observed : " It is possible for an emigration habit to arise not necessarily connected with financial or seasonal stress at home. This existed to some extent in Europe as regards America towards the end of the 19th century and undoubtedly existed in Southern India and the Circars' Coast touching the movement to Ceylon, Malaya and Burma."<sup>1</sup>

An emigration tradition has no doubt existed in Southern India for at least a century. This emigration, however, is not comparable with the emigration from Europe to America in the 19th century. While the European emigration to America has almost invariably been of a permanent character, the emigration from Southern India has been predominantly a periodic or a seasonal movement. The European analogy in this connection is therefore largely wide of the mark. The question, however, stands out as to why such tradition should arise at all. And again why should it continue unabated over the length of a whole century ? Mr. Ranade, who was the first to study Indian foreign emigration, referred to inland and overland emigration, as " the overflow of surplus population from the congested parts of the Country to Lands where Labour is dear and highly remunerative."<sup>2</sup> Mr. Ranade undoubtedly believed in the economic causation of migrations.

The view that emigration is an overflow of surplus population in a particular region has been challenged by Prof. Carr-Saunders. He argues that overflow implies a previous under-population. Under-population does not, however, normally exist, except in temporary situations, and moreover there is the fact that people in areas generally recognized as overpopulous are, on the whole, the ones who do not move out. The real main spring of migration is the political or moral ideals of a people. Migration is a matter of morale. " It is undertaken " remarks Prof. Carr-Saunders " in response to an idea."<sup>3</sup>

<sup>1</sup> Census Report, Madras, 1931, p. 79.

<sup>2</sup> "Essays on Indian Economics", Justice M. G. Ranade, 1898, p. 122.

<sup>3</sup> "The Population Problem: A Study in Human Evolution", Prof. Carr-Saunders, 1922, p. 300.

This is indeed a cogent rebuke to the extreme 'overflow-theorists.' It is, however, merely contentious to deny that the pressure of population plays an important part in human migrations. The flow of emigrants from the regions of Southern India is the greatest from the districts of the least irrigation possibilities. Vizagapatam, Salem, Trichinopoly and Ramnad all fall into this category. This is an established fact.<sup>1</sup> It has also been noted previously that both in the United Provinces and Bihar the volume of emigration corresponds to the state of harvests. If the harvests are good the emigration diminishes if they are bad it is larger and lasts longer. Migration, in this light, appears to be mostly an economic and a social phenomenon. Though emigration does not necessarily mean over-population, it is in every case a sign that conditions are more attractive, generally from the economic point of view, in other regions. 'When it becomes practically a mass phenomenon, persistent and on a large scale, it does, however, give good ground for the belief that over-population exists.'<sup>2</sup> Again the way in which migrations respond to the economic fluctuations at home and abroad, only emphasises the fact that its causation at the root is economic and social.<sup>3</sup>

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1 Census Report, Madras, 1931, p. 23.

2 European Conference on Rural Life, League of Nations, Document No. 1 1939, p. 57. Discussing the motives for emigration from Germany Dr. Burgdorfer has observed: "The most important factors, however, have been economic and social. They are the material foundation upon which psychological motives develop. If people are satisfied with their lot they have no motive to migrate. *Ubi dene ibi nutiri*. But if single persons or whole classes find their economic existence seriously threatened by a failure of crops or other misfortunes, they will often resort to emigration as a road by which to escape life's tribulations or to improve their lot. To be sure, want does not always drive people to this resolve. It may make them dull and apathetic, scarcely able to come to so momentous a resolve. Only when a sense of want is coupled with the courage to run risks and with a knowledge of better conditions or a better outlook elsewhere, does the resolve mature." International Migrations, Vol. II—Interpretations, National Bureau of Economic Research: Inc. New York, 1931, p. 341.

3 See Migration and Business Cycles, Jerome, 1926. As a point of general interest in this connection the following points regarding Swedish migrations may be noted. In explaining migration (internal and external) a major factor appeared to be the recurrent 'pulls' resulting from cycles of business activity at the destination (America and urban Sweden), the steady 'push' of persistent wage differentials between agriculture and industry, and of only less importance, intermittent intensification of the 'push' as a result of crop failures and Swedish business cycles. Social and Economic Aspects of Swedish Population Movements, 1750-1933, Dorothy Swaine Thomson, New York, 1941 also Migration and Economic Opportunity, Goodrich, Carter and Others, Philadelphia, University of Pennsylvania Press, 1936.

Even regarding migrations as an economic phenomenon a further question crops up as to whether the immigrants into a region are "pulled" towards it by its relative prosperity or "pushed" towards it by the comparative adversity in home regions. Regarding European migrations, Mr. Glass has observed that "in the past immigration has responded to the pull of prosperity from new countries rather than the push of poverty from their own countries."<sup>1</sup> Emphasis on either the 'push' or the 'pull' may, however, be doubted. For both the factors are of equal importance, the more so as they act in the same direction. In India 'pull' factors such as attractive wages or cheap land combine with 'push' factors such as the decline of the migrant's occupation, the poverty of his family or the restricted economic sphere of his community of origin. In particular cases one of these factors may be relatively more operative than the other. But it is idle to contend that 'push' or 'pull' alone and singly actuate movement. To invoke Marshall's classic image it might as well be disputed which of the blades of a pair of scissors cuts a piece of paper.<sup>2</sup>

While still on the subject of migratory movements in general, the oft-repeated but ill-substantiated view, that Indians are mostly a stay-at-home people may be examined. It is difficult to understand as to what has given rise to this sweeping statement and its equally uncritical acceptance. The view, that Indians are a stay-at home people, seems to be very old. Mr. Ranade sounded a note of warning against this view, as early as 1893. He wrote: "The last Census Reports have demonstrated the fact that the disinclination of the Natives of this Country to leave their ancestral Home has been much exaggerated, and that a much larger proportion of our population shows migratory habits than we were disposed at first to believe<sup>3</sup>." The migration statistics contained in the Indian Census Reports are responsible for the above view to a large degree. These reports provide, what are technically called, "birth-place statistics." Such statistics only give the number of people in a region or a district who were not born in that region or district and *vice versa*, at the time of the census. During the

1 Population, Policies and Movements in Europe, 1940, p. 352.

2 For an excellent discussion on this point, see Rural Migrations in the United States, Lively and Tasuber, Works Progress Administration, Research Monograph XIX, Washington, 1939, pp. 81-82.

3 M. G. Ranade, "Indian Foreign Emigration", in "Essays on Indian Economics", 1898, p. 132.

period between two censuses, a large number of people might emigrate out of the region and come back after some time. A small percentage of them might settle outside the region. The census will only show the residual effect. The birth place statistics "take into account only the net result of migration at any given time and neglect the much larger number of migrations which produced the net result."<sup>1</sup> The migration statistics in the Indian Census Reports therefore do not give an adequate or a correct idea of the migratory habits of the people. As the Census Superintendent of Punjab for 1921 observed, "In respect of migrations it is as though one instantaneously observed myriads of flying-fish emerging from and disappearing into a sunlit sea."<sup>2</sup>

Again, we have sufficient evidence to say that Indians have long-standing migration traditions. Pointed attention may be drawn to the continuous flow of Indians to Mauritius, British Guiana, Trinidad, etc. before 1900. This flow originated as early as 1834. Again, the Tamil emigration to Ceylon and Malaya has a history of two centuries. The migration of people from Bihar, Orissa and U. P. to Assam is also fairly old. In view of these considerations to say that Indians are a stay-at-home people is, I think, very untrue. For a proper study of the migration habits of a people an altogether different kind of data, than those available in Indian Census Reports, are necessary. As Professor Gunnar Myrdal has observed "Census figures of the distribution of population between different occupations and localities do not even give what may properly be called a secular trend, but gives only the "secular result" of migration; and furthermore do not even give this "result" in a pure form, but give the mixed result of migration plus natality and mortality. Yearly data are indispensable for any study of migration."<sup>3</sup> Until such statistics are compiled and made available, it is improper and uncritical to generalise glibly about the stay-at-home-ness of the Indian people. In the light of these facts and subsequent developments, Mr. Ranade's remark has remained a fair comment.

Two types of emigration must be distinguished the permanent and the semi-permanent or the temporary type, the latter including both seasonal and pluriennial. The first of the two types is found in the emigration to Canal Colonies in the North-West Dry

<sup>1</sup> Research in Rural Population—Scope and Method; Ed. John Black, Social Science Research Council, Bulletin No. 4, New York, 1932, p. 53.

<sup>2</sup> Census Report, Punjab, 1921.

<sup>3</sup> "Industrialization and Population," in "Economic Essays in Honour of Gustav Castel", 1933, p. 438.

Area, Punjab, and the influx of Mymensighites into the Brahmaputra Valley. The second type is met with in the movement of labourers from North Bihar, South Bihar, and East Coast Madras, North to the tea gardens of Assam and the movement of people from East Coast Madras, South to Burma, Ceylon and Malaya. The two types of emigration differ widely as to their ultimate or long period effects on the residual population in an emigration region. The permanent type of emigration relieves the pressure, that the emigrants would exert by living at home, on the resources of the home region, permanently. In the case of semi-permanent emigration it relieves the burden only temporarily. The semi-permanent emigrants maintain contact with their homeland. "These emigrants remain essentially part of the population of their home region, particularly in the case of latter type (seasonal emigration). Their emigration is only a means of eking out the inadequate resources obtainable in their own districts.<sup>1</sup>" These emigrants send in money orders to the people at home making possible their (people at home) continual subsistence in the home region. On their part, they have their native villages and lands to fall back upon in times of crisis and economic stress in the region to which they migrate.

The question next arises : Does temporary emigration, like permanent emigration, shift some amount of burden from the resources of the home region, when it is a regular feature from year to year ? It no doubt eases the burden somewhat in short periods but it does so more effectively, if the ratio of emigration to the total population of the home region increases continuously. If this condition is fulfilled then only is there a substantial easing of the burden, in short periods. So far as can be judged from the deficient migration or birth-place statistics available regarding the regions studied, it can be said that a situation such as the above was not present in any of the regions. This statement should be taken with all its limitations and with caution.

Does permanent emigration constitute an economic loss to the home region ? If the emigrants had not gone out their energies would have been available for the further exploitation of the existing resources in the home region. The essential problem, however, is whether this could have yielded a commensurate return ? Emigration, which ignores a possible adequate return at home, is definitely an economic loss to the home region. In the opinion of some for instance, the winter crop in Konkans is being neglected because of the movement of its people to Bombay. In so far as the winter crop in Konkan is being neglected, inspite of its yielding adequate

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<sup>1</sup> League of Nations Report, Op. cit, p. 58,

returns, by the preference of its people for going out to Bombay, the semi-permanent emigration from Konkan does constitute an economic loss. But if the opportunities in this direction are not ample enough, the emigrants by going out earn more than they can do at home. The existing resources of the home region would have been forced to bear their burden if they had chosen to stay. By going out, they reduce competition at home, and thus increase, to some extent at least, the margin of income of those living in the home region. Thus it means an economic gain in short periods. In the case of temporary migration, this gain is largely cancelled in the long period, due to the fact that the emigrants return to their home in old age, (though with savings from abroad in a few cases) and fling their additional burden on the resources of the home region. This is mostly the case, so far as can be judged from the available material, in what are called the "recruiting regions" (U. P., Bihar, Orissa,) in India.

The permanent type of emigration affects the age composition<sup>1</sup> of the home region population adversely but the semi-permanent type does so more disastrously. Emigrants are generally energetic young people between the ages of 15-40 years of age while those who remain are old, decrepit or relatively unintelligent. The permanent type of emigration shifts men in their prime of life from the home region to other regions. The semi-permanent type, in addition to shifting young men, adds the dead weight of the returning old ones to the already aged residual population. This is probably the case, in North Bihar, South Bihar and East Coast Madras, South, so far as can be judged.

The effects of emigration, both of the permanent and the semi-permanent type, on the age structure of the residual population from the point of view of reproduction are also harmful. The pick and flower of the emigration region is carried away by emigration. This affects fertility. In the case of East Coast Madras, South, for example, the Census Superintendent for 1931 observed :

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1 "Changes and differences in the age distribution are among the most important results of migration in its dynamic phase. These changes and differences have in their turn effects upon migration, partly directly and partly indirectly through changes and differences in the relative number of births and deaths, which, to a certain extent, must be supposed to influence migration. Population must be conceived of as an interdependent mechanism, and it is this mechanism as a whole which must be supposed to undergo changes under the influence of (or, better, in some relation to) social and economic changes of different kinds". Prof. Gunnar Myrdal, "Industrialisation and Population," in "Economic Essays in Honour of Gustav Cassel," London, 1933, p. 439.

" where emigration is predominantly male and for periods extending to two or three years, an obvious effect on fertility might be expected, which is borne out by the birthrate in the Southern Tamil districts, which contribute most heavily to Ceylon and Malaya emigration, running generally below that for the rest of the presidency."<sup>1</sup> Similar is the case in Konkan and Orissa. Emigration has, thus, not only an immediate but a continuing harmful effect on the residual population. In the case of semi-permanent emigration, it is economic as well as biological. It occasions a loss on the swings as well as on the roundabouts.<sup>2</sup>

Age composition in emigration regions is, in some cases, somewhat balanced by immigration. This is, for example, broadly the case in Indo-Gangetic Plain, West. It must be recognized, however, that such a balance is only statistical. There are two kinds of balances, statistical and biological. The first consists merely of the balance of age group frequencies in a region irrespective of their location. The second, while including the first, also means the balance of the whole biological plexus of a region. The balance referred to above is of the first kind; the second is not restored. In urban areas there might be male (immigrants into the region) in their prime of life without their families and in rural areas (emigrant homes) there may be females of reproductive ages living without their husbands (emigrants to outside regions). Thus fertility is reduced and the biological balance is not struck. Even the statistical balance is restored only if the immigrants are fresh ones and not the old ones returning home, otherwise it only gives an "accessive" appearance to the residual population. In regions such as these there is always the possibility of the outside emigrants being replaced by the people at home, who migrate to other regions.

Immigration also invites some comment. Two types of immigration must be distinguished, immigration into urban areas, as into Bombay City, Hooghly and Howrah, and immigration into agricultural lands, as into the Canal Colonies, Brahmaputra Valley and post-Barrage Sind. Immigration into urban areas is a fairly common phenomenon in industrially developing regions.

<sup>1</sup> Census Report, Madras, 1931, p. 54.

<sup>2</sup> For an interesting discussion on this subject see Dr. Burgdorfer's article "Money Value of Emigration," in International Migrations 2 Vol. II Interpretation, I. L. O. New York, National Bureau of Economic Research Inc. 1931 Cf., Rural Migration in the United States, Lively and Taeuber, Works Progress Administration, Research Monograph XIX, Washington, 1939, pp. 119-133.

Immigrants from rural areas are attracted by the industries of the urban areas and they supply the growing demand for labour in those industries. They are agricultural workers at home but industrial workers abroad. Thus this kind of migration is not only a movement in space but also an occupational movement. The latter kind of immigration is quite distinct from this. Immigrants into agricultural lands do not change their occupation. At home and abroad, they are agriculturists. It is only a movement in space.

Such agriculturally growing regions should be known as "frontiers", a concept often used in U.S.A. in such discussions. "A frontier may be thought of as a region of low population pressure to which migrants from regions of high population pressure naturally tend to flow provided the channels of migration (communication and transportation) are open. By a "low pressure" region is meant one where land is plentiful and labour scarce; where new economic opportunities and the promise of a higher standard of life beckon; and where community overhead costs are low and competition less strenuous".<sup>1</sup> In the above sense the Brahmaputra Valley, post-Barrage Sind and North-West Dry Area Punjab, are "frontiers".

An immigration movement of any considerable size sets up certain strains and stresses in the general population. Changes in such particulars as the proportion of the age classes and the sexes have far-reaching effects on social phenomena. Immigration influences population trends in a region in two ways. It swells the number of people in that region, apart from anything else. In the second place, it raises the crude rate of natural increase not simply by a regular supply of fresh persons, but also by bringing into the region people in age-groups with a relatively low mortality, who would thus tend to depress the crude death-rate of the region. Immigrants are preponderantly male and past the age of childhood. Thus the age composition of a region, which receives immigrants, on a large scale, shows the predominance of young people. The population is more vigorous and younger than that of the emigration regions. Unlike the latter, therefore, the age composition of the population in the former is more favourable for a rapid growth of numbers. This can be illustrated from the movement of population in the "frontiers" above mentioned.

The economic aspect of immigration may be briefly commented upon. In regions like West Bengal, the Brahmaputra and the Surma Valleys immigration has made possible a fuller development of their

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<sup>1</sup> People of Kansas, Clark and Roberts, Kansas State Planning Board, 1936  
p. 62.

respective economic potentialities. If there had been no immigration into these regions their economic development could not have been as great as it is today, due to labour shortage.<sup>1</sup> Immigration, as in America,<sup>2</sup> is greatly responsible for the economic prosperity of these regions. In this sense immigration may be said to bring with it its own prosperity, though a part of it is lost to the region through the remittances, in the case of temporary immigrants, to their home regions. This does not happen in the case of permanent immigrants, as they plough back their own prosperity into the land of their adoption. In the case of temporary immigration, the prosperity of the immigration region spreads to the emigration region, to some extent.

How does migration affect the sex-composition of the population? Migrations are commonly regarded as a male phenomenon and this is broadly true. If a large number of young men emigrate from a region the sex-composition of the residual population is bound to be affected.<sup>3</sup> But there are different types of migrations and they affect the sex-composition in different ways. In fact, the sex-ratio among migrants is taken to indicate the character of migrations. A greater proportion of females is taken to indicate the permanent or the semi-permanent type and *vice versa*. In seasonal or temporary migrations males preponderate, for males are the more

1 The case of West Bengal, and of Bengal in general, is rather peculiar. The Bengalis do not man their home industries. Are the Bengalis a stay-at-home people who do not move out? This seems to be contradicted by the efflux of Mymensinghites into the Brahmaputra Valley. It seems thus that migration to agricultural lands is present, but migration to industrial areas almost absent. There is a spatial movement unaccompanied by an occupational movement. For the explanation of this phenomenon we look in vain. Are agricultural wages in Bengal higher than industrial wages the wage differential keeping the indigenous agricultural labourers away from industrial employment? Do the Biharis underbid the indigenous labour in Bengal? And if so, whether agricultural wages in Bengal are higher than those obtaining in Bihar? All such questions have to be answered before a satisfactory explanation can emerge.

2 Population Movements, Dr. Kuczynski, 1936, p. 76.

3 As a rather remarkable observation the following may be noted. M. Adolph Jensen writes regarding Denmark, Norway and Sweden: "As migration has carried away more men than women, the natural proportion between the sexes has been disturbed. On the population as a whole, however, the influence of migration in this respect is less than might have been expected (at the time of writing (1926) the number of women per 1000 men in Denmark was 1051, in Norway 1053, and in Sweden 1036). It is considered demonstrated that after emigration began to increase, the number of both births and deaths has distributed itself more favourably than before for the maintenance of the relative figure of the male sex." International Migrations, Vol. II<sup>nd</sup> Interpretations, National Bureau of Economic Research, Inc. New York, 1931, p. 311.

mobile and migratory sex and make up a large proportion of the birds of passage emigrants or repeaters. Thus if emigration from a region is of the permanent kind the emigrants are likely to have a large proportion of females, and this may affect the sex-ratio of that region's residual population quite evenly. For males, as well as females leave the region and perhaps in equal numbers. Permanent emigration, however, may not always carry away an equal number of males and females. In the measure of that discrepancy is the sex-ratio of the residual population affected.

In the case of seasonal or temporary migrations the sex-ratio is also affected seasonally or temporarily. If the Census enumeration, however, takes place when the seasonal or temporary emigration is at its full tide, the predominance of females in the emigration regions is emphasised out of all proportion. This is broadly the case in Bihar and Orissa. In this province the emigration flow is at its maximum in the month of February and the Census enumeration generally takes place at the end of February or the beginning of March.<sup>1</sup> Thus, even the date of the Census enumeration may apparently influence the sex-ratio in different regions in different ways!

The problem of the sex composition of the populations of various regions deserves closer study. The statistics of the number of females per 1,000 males in actual population were examined in the case of every region. In all the regions some very interesting features were markedly clear. In East Coast Madras, North and Orissa, the number of females per 1,000 males, in actual population, had increased till 1921 and had declined in 1931. On the other hand, in East Coast Madras, South and Travancore the number of females, in actual population, had decreased till 1921 and had increased in 1931. In the North-West Dry Area, Punjab, the number of females, in actual population, had increased since 1911, while in Cochin it had increased continuously since 1881. In all other regions the number of females, in actual population, showed a continuous decline. The male-female proportions examined with reference to natural population, in the case of North Bihar and South Bihar, showed that the number of females had declined, in both the areas from 1891 continuously till 1921. A general tendency of the females to decrease was marked when moving from regions of the south-east to those of the north-west.

<sup>1</sup> Census Report, Bihar and Orissa, 1931, p. 105.

The decline of females, in a majority of the regions studied lends some support to the belief that it is a recent general trend in Indian population movements. Several explanations have been put forward to explain this tendency. Some have tried to explain it on the lines of racial genetics, contending that the racial composition of the population in North Western India favours masculinity.<sup>1</sup> There is, however, nothing to show that the genetical make up of certain races is more favourable to masculinity than that of others. So also no evidence is forthcoming to show that sex determination conforms to racial aptitudes. In fact, the problem as to what determines the sex of a child has not yet been solved satisfactorily.<sup>2</sup>

The proportion of male to female births in India is 108 to 100, while it is generally 106 to 100 in western countries. Some explanations for this are also forthcoming. "Gill avers that British India now presents the plexus of nascent population which includes a high rate of natural increase for short periods" and where female population is less than the male population. Cedric Dover maintains "that the male producer sperm being more vigorous but less resistent to the unfavourable influences outnumbers female producer sperm under good environmental conditions and *vice versa*. The result is that improved living conditions are associated with an excess of males over females."<sup>3</sup> What can one possibly say about these various ingenious explanations? No definite opinion on them can be hazarded at this stage.

Another one of such theories is that of Mr. Wendel Cleland who discovered a correlation between irrigation and the male-female ratio in Egypt.<sup>4</sup> He found that the more the irrigation water on land the fewer the number of men. This was examined in the case of Sind and the North-West Dry Area, Punjab and in both the cases the data available could not give any significant conclusion. It must be recognized that there is always a fallacy

<sup>1</sup> Population Problem in India, P. K. Wattal, 1934, p. 14. also India's Teeming Millions, Dr. Gyan Chand, 1939, p. 133. The latter says, however, that no generalisation on this point is possible.

<sup>2</sup> Cf. D. H. Sandell, British Medical Journal, 4th December 1937 p. 1145. Genes and Hormones, British Medical Journal, 28th October, 1939, p. 860: See also Prof. Danforth "Genes and Hormones" in "The Harvey Lectures", 1938-39, Harvey Society, New York, 1939.

<sup>3</sup> Prof. R. B. Lal, "Vital Statistics", in the Proceedings of the 2nd All-India Population Conference, 1938, p. vs. 3-4.

<sup>4</sup> Population Problem in Egypt, Wendel Cleland, 1936, p. 81.

involved in such empirical-cum-statistical correlations. There may be a perfect statistical correlation between two different series of figures and yet one may not be causally related with another. There might be, what Professor Pigou has called, "a suppressed third factor", influencing both, "which we have altogether missed." The correlation between irrigation-water and sex-ratio, therefore, cannot be accepted as valid unless a more reasonable explanation of the causal link between them is forthcoming.<sup>1</sup>

No definite conclusion on this complicated problem is possible at least for the present. The deficiency of females and its continuation over a long period remains a mysterious fact, so far

<sup>1</sup> form of a mathematical statement does not necessarily tell you anything about the process it describes. All that it does is to tell you how to calculate a result." Mathematics for the Million, 1936, p. 637.

## CHAPTER VI

### The Summing up.

A study of the "movement of population" in various regions indicates a very broad generalisation regarding the "movement of population" in India, as a whole. The population in India manifests a tendency to multiply continuously and this process is frequently interrupted by diseases, epidemics and famines. But the break thus occasioned, though very violent sometimes, proves to be only temporary and the original tendency asserts itself almost immediately. All the regions studied in the preceding pages conform to this type. They have maintained "reproductive patterns", to use Dr. Pearl's expression, which are broadly the same over the last three or four decades. The birth-rate for India as a whole, so far as it can be relied upon as representative of all the regions in India, has remained steady since the turn of the century.<sup>1</sup> This merely under-lines the above statement.

This statement is not incompatible with theory. In any society the birth-rate is primarily affected by socio-economic factors obtaining in that society, which are rooted in the prevailing economic and biological factors. It is unnecessary to go into the question as to how and why the social factors play the dominant role in determining the birth-rate of a society.<sup>2</sup> The social fabric of the Hindu society is so adjusted as to give free play to biological processes.<sup>3</sup> Similar is the case with Mohammedanism. The population,

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1 "A Forecast of Population in India at the Census of 1941," by the Professor of Vital Statistics and Epidemiology, All India Institute of Hygiene and Public Health, Calcutta, Times of India, 30th September, 1937.

2 See for an excellent discussion : India's Teeming Millions, Dr. Gyan Chand 1939, Chapter VI. Also Professor J. B. S. Haldane, "Science and Ethics" in "the Inequality of Man and other Essays", 1932; "Scientific Research and Social Needs" Professor Julian Huxley, 1934; P. K. Whelpton, "Why the Large Rise in the German Birth Rate", American Journal of Sociology, November 1935.

3 "We must, for example, remember the anxiety of the ancient Aryans to colonise the land. We are also apt to forget that till the establishment of the British rule, there was practically no part of this country which enjoyed long periods of peace, unbroken by war. It is, therefore, not surprising to find a general tendency towards an expansive policy of population. At the same time restrictive influences were also at work," P. M. Lad, "Population" in "Economic Problems of Modern India", 1939, p. 82. To say, however, that there is a "tendency" towards a "population policy" is, I think, a contradiction in terms.

therefore, shows a continuous tendency to grow because the existing social fabric of the Indian society favours such a growth. That the birth-rate has remained steady, since the beginning of the century, only shows that it has reached a level that is in harmony with the prevailing socio-economic forces that influence population in India. The social structure of the Indian society has remained the same, for all practical purposes, until now. The social reforms of recent years have only scratched the surface. The core has remained intact.

As the birth-rate shows no significant movement death-rate remains the decisive factor controlling the movement of population. Dr. Kuczynski writes: "Fertility in India and China may be higher than it ever was in Western Europe. But mortality in both countries is excessive, and their net reproduction rate is probably not much above unity. The future population trend of these countries will depend largely on the trend of mortality."<sup>1</sup> The factors that govern death-rate in India are diseases, epidemics and famines. They are emphasised on the lurid background of India's poverty-stricken millions, whose resisting capacity to disease is very low. These factors affect the movement of population in different ways. Famines take away people at the two extremities of life and leave behind a preponderance of people at the reproductive ages, who rapidly multiply. A famine is generally followed by a rapid population increase.<sup>2</sup> The influenza epidemic of 1918 carried away people at the reproductive ages. The plague epidemics were more fatal to women, especially those in the prime of life.

It has been remarked that certain sections of the Indian population, like the Muslims and the Aboriginals, multiply more rapidly than the other sections.<sup>3</sup> This has always been explained as due to racial factors. What is the role of racial factors in the prolificness or otherwise of a community of people? The question arises as to what is a "race"? There is no satisfactory definition of a race. The term "race" is used in several quite different senses. The trend of modern research is towards showing that "race" is not a biological or a genetical concept. It is

<sup>1</sup> Population Problem : The Experts and the Public, 1938, p. 118. See also Dr. Kuczynski's observations regarding the movement of population in India during 1921-31 in his article, "The Population Problem", Statist, December 25, 1937, p. 877.

<sup>2</sup> See the movement of population in several regions after 1897-98 famine, Chapter III.

<sup>3</sup> Muslims in East Bengal and North-West Dry Area, Punjab; Aboriginal Tribes in the Chota Nagpur Plateau and Assam.

a social or a geographical one. There are no innate biological differences between the so-called races. "The differences within a race are greater than the differences between races".<sup>1</sup> It is therefore, wrong, to call the Muslims a separate race. The term can be applied in a broad way to the aboriginal tribes of India, in so far as they constitute a separate "ethnic group". Racial genetics does not account for the prolificness of these two sections of the Indian population.

It is no doubt true that the Aboriginal tribes and the Muslims have shown a larger rate of growth as compared with other communities, especially the Hindus. This is of great interest from the sociological standpoint and should therefore be dealt with in more detail. If the percentages of the growth of population per decade of the respective communities, in all the regions considered here, are examined it at once becomes clear that all along the Muslims have shown a larger growth than the Hindus. It also appears that the Sikhs in the Punjab and the Chirstians in Travancore have both shown greater percentages of increase than the Muslims in those tracts. The following figures give the percentage growth of the Hindus and the Muslims in some regions.

<sup>1</sup> Heredity and Politics, J. B. S. Haldane, 1938, p. 138. Also, We Europeans Julian Huxley and A. C. Haddon, 1939; Dr. Pearl's recent researches generally indicate that there is no genetical and biological difference between the Negroes and the Whites in U. S. A., Natural History of Population, Dr. Raymond Pearl, 1939.

Region	Religion	1931	1921	1911	1901	1891
Cochin	Hindu	+20.7	+4.3	+11.1	...	...
	Muslim	+27.9	+7.7	+17.1	...	...
Travancore	Hindu	+23.0	+11.7	+12.1	...	...
	Muslim	+30.6	+19.4	+18.9	...	...
East Bengal	Christian	+36.8	+29.8	+29.6	...	...
	Hindu	+5.8	+4.6	+6.5	+6.8	+10.0
Chota Nagpur Plateau	Muslim	+11.8	+9.9	+14.7	+12.4	+17.6
	Hindu	+18.8	+3.3	+9.8	...	...
North-West Dry Area, Punjab	Muslim	+24.6	+5.7	+17.2	...	...
	Hindu	+8.4	+13.1	-12.8	+48.1	+18.2
	Sikh	+19.3	+6.5	+16.8	+35.8	+12.6
Madras East Coast, North	Hindu	+43.9	+8.2	+121.4	+185.7	+78.6.
	Muslim	+11.3	+2.5	+9.5	+7.2	...
Madras East Coast, South	Hindu	+18.2	+6.3	+12.9	+12.7	...
	Muslim	+3.9	+2.9	+8.6	+5.3	...
Orissa	Hindu	+5.6	+0.2	+10.4	...	...
	Muslim	+5.6	+0.9	+10.6	+5.7	...
North Bihar	Hindu	+7.5	-0.8	+1.3	...	...
	Muslim	+12.6	+0.8	+3.3	...	...
Sub-Himalayan Punjab	Hindu	-7.2	-2.0	-22.2	-9.5	+4.7
	Muslim	+11.8	+1.0	-5.1	-0.9	+7.5
	Sikh	+32.0	+0.9	+61.3	-5.0	+29.7
West Bengal	Hindu	8.4	-5.2	+1.7	+7.1	+3.1
	Muslim	13.0	-4.9	+4.9	+8.6	+4.3
Indo-Gangetic Plain, East	Hindu	15.6	+0.6	-4.7	-7.4	+5.0
	Muslim	+8.0	-1.3	-10.0	-4.7	+2.8
Indo-Gangetic Plain, Central	Hindu	+4.4	-4.3	-3.9	+0.9	+8.4
	Muslim	+9.3	-2.8	-3.2	+3.9	+9.2
Indo-Gangetic Plain, West	Hindu	+5.2	7.3	-2.8	+8.8	+0.8
	Muslim	+10.5	-4.1	-1.8	+13.0	+3.7
South Bihar	Hindu	+11.7	-2.4	+0.9	...	...
	Muslim	+19.9	-3.7	-2.8	...	...
Central India Plateau	Hindu	+8.6	-6.7	+4.7	-8.7	+3.4
	Muslim	+10.9	-3.9	+5.5	-4.8	+8.4

These figures ( and figures for other regions also ) bring out the significant fact that the Muslims have not only shown a greater increase but in decades in which populations decreased in many regions, they have recorded a smaller percentage of decrease in contrast with other communities. Only in the Indo-Gangetic Plain, East and South Bihar, in two decades ( 1901-1911 and 1911-1921 ) have the Muslims registered a greater decrease than the Hindus.

On the other hand there are several instances in which they have actually increased in decades in which the Hindus have decreased, in one and the same region.

That the Muslims have grown faster than the Hindus is a fact. Are fertility and mortality more favourably balanced in the case of Muslims than in the case of the Hindus? The greater prolificness of the Muslims has always been taken for granted. The reasons adduced are firstly, that as a race they are more prolific, secondly, some social customs of that community, like the prevalence of widow remarriage and polygamy, give rise to greater fertility. Can these claims stand the test of analysis? It will be seen that they do not.

In the first place, as has been argued earlier, Muslims do not constitute a separate race, as such. There is also no evidence to show that Muslims in a region are racially distinct from the Hindus of that region. There is no evidence to show, even if they are regarded as a separate race, that one race is more prolific than another due to some innate biological differences of their respective makeups. Racial genetics does not warrant any such conclusion.

What about the social customs? If widow remarriage is prevalent among Muslims it is equally prevalent among Hindus, except in the upper castes which are numerically small. Among Muslims also several local customs come in the way of widow remarriage.<sup>1</sup> As to polygamy also it is equally prevalent in many classes of the Hindu community. In many parts of India, polygamy has become an economic proposition, (as it increases the family labour force) rather than a religious injunction or a social custom. It is, therefore, common to all. The practice of circumcision among the Muslims does not account for much either. It makes for a better organic hygiene but does not in any way increase fertility.

In fact, on a closer analysis, the greater prolificness of the Muslims seems doubtful. The results of the fertility enquiry conducted in 1931 gives it the lie direct. Here are some facts and figures regarding the fertility of different communities in different regions. In Travancore the fertility rate of Muslims is higher than the fertility rates of Brahmins and the depressed classes but all others classes of Hindus show a much higher fertility than the

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<sup>1</sup> India's Teeming Millions, Gyan Chand, 1939, p. 142.

<sup>2</sup> Census Report, Travancore, 1931, p. 47.

Muslims.<sup>2</sup> In Cochin the Muslims show a higher fertility than the Hindus. In Punjab the Muslims together with the Jains have the lowest fertility.<sup>1</sup> In West Bengal the Muslims have the highest fertility and survival rates, while in East Bengal they have the lowest survival rate and their fertility rate is only slightly higher than that of the Hindus.<sup>2</sup> According to a later enquiry, in Bengal as a whole, the average fertility rate was 167 for the Hindus and 148 for the Muslims in 1933.<sup>3</sup> In the Bombay Presidency "the Muslims return definitely lower figures for net fertility than the Hindus. Their figures of absolute fertility are lower than those for the Hindus in both Gujarat and the Konkan but slightly higher in the Deccan."<sup>4</sup> These facts do not establish the general case for a higher Muslim fertility as compared with the Hindus.

How does mortality affect the growth of the Muslims? The evidence on this point is scanty and undecisive. The Census Superintendent of the Punjab for 1931 explained the faster growth of Muslims by remarking that though their fertility rate was lower, their survival rate was higher.<sup>5</sup> He also said that there were two causes for the faster growth of Muslims in the Punjab; first, the healthiness of the tracts in which the bulk of the Muslims were concentrated and second, the great economic development that had taken place in those areas.<sup>6</sup> In Bihar mortality was higher among the Hindus than among the Muslims according to the Census Superintendent.<sup>7</sup> In Bengal on the other hand, the Muslims have shown a high death rate than the Hindus. Mr. H. G. Meikle, Actuary to the Government of India, remarked in 1921: "Muhammedans have a heavier death-rate than the Hindus at all ages amongst females in Bengal."<sup>8</sup> With these insufficient data no definite conclusion on this point is possible.

There are, however, two factors regarding the faster increase of Muslims which must not be forgotten; first, the influence of conversions to Islam and second, the fact of the inflation of Census figures in favour of the Muslims in some cases at the 1931 Census. The data regarding conversions are not sufficient. In Cochin and Travancore

1 Census Report, Punjab, 1931, p. 179.

2 Census Report, Bengal, 1931, p. 173.

3 Public Health Report, Bengal 1933, p. 13.

4 Census Report, Bombay, 1931, p. 173.

5 Census Report, Punjab, 1931, p. 179.

6 Census Report, Punjab, 1931, p. 313.

7 Census Report, Bihar and Orissa, 1931, p. 253.

8 Report on the Age Distribution and Rates of Mortality deduced from the Indian Census Returns of 1921 and previous enumerations, p. 20.

conversions to Islam are very rare. In Bengal, the Census Superintendent thinks that conversions do not play a significant part in the faster increase of the Muslims.<sup>1</sup> The Census Superintendent of Bombay, however, feels that conversions do play such a part.<sup>2</sup> The Census returns of 1931 in some regions were affected by the Civil Disobedience Movement in favour of the Muslims as Hindus were under-enumerated due to the boycott on Census operations. In the Broach and Ahmedabad districts in Gujarat this was particularly so.<sup>3</sup> This is again confirmed by the results of the sample surveys of some villages carried out for the Bowley-Robertson report on the Scheme for an Economic Census of India (p. 22-23). These are some of the considerations regarding this complicated question. One or the other aspect is emphasised in its regional context.

The case of the Aboriginal Tribes of India falls into a different category. The primitive tribes in India have increased considerably during the last decade. From 16 millions in 1921 they have increased to 25 millions in 1931. It must be borne in mind that the Census enumeration among these tribes has increased in efficiency with every successive Census because of the growing communications and the increasing transition of these tribes from nomadic to more settled ways of life. Due allowance must be made for this consideration.

Unlike the Muslims, the Aboriginal Tribes do show a higher fertility rate than the other communities. But their survival rate is low, due to the higher mortality rate among them. In a survey of 1380 tribal families from six primitive tribes in the United Provinces, Bihar and Orissa, Assam and Madras, Dr. Majumdar found that the average number of children born to each family was 6.9 and out of these 3.8 survived.<sup>4</sup> The Census Superintendent for Assam in 1931 found that the average number of children per family among the tea-garden cooly-castes was 3.4 while that among the hill tribes was 4.7. At every period of marriage duration, "hill women have more children than cooly women and

<sup>1</sup> Census Report, Bengal, 1931, p. 390.

<sup>2</sup> Census Report, Bombay, 1931, p. 361.

<sup>3</sup> Census Report, Bombay, 1931, p. 361.

<sup>4</sup> Dr. D. M. Majumdar, "Primitive Society and its Discomforts," the 2nd All-India Population Conference Report, 1938.

at the end of her reproductive life, a cooly woman would normally have 6 children and a hill woman 7 to 8<sup>1</sup>.

At this stage a short discussion of the tribal societies and their *mores* is necessary. In tribal societies, with their imperfect and perfunctory control over the natural environment, an equilibrium between population and environment is maintained by a low birth-rate and death-rate not far below it. The fertility is kept low by various tribal customs and taboos connected with conjugal activity<sup>2</sup>. This is also due to the fact that fecundity or the reproductive power is less in barbarous than in civilized societies.<sup>3</sup> When these tribal societies come into contact with an advanced civilization or come to be administered by a power representing a higher civilization their old mode of life suffers a change. Their control over their natural environment considerably increases. As a result of the impact of a higher civilization the tribe as a unit begins to disintegrate and tribal life loses its solidarity. The tribal customs and taboos associated with sexual activity also gradually lose their force and cease to be effective. The nomadic tribal ways of life are abandoned for a more settled scheme of existence as their control over the natural environment increases. Shifting cultivation is replaced by settled agriculture. The new conditions of life are favourable to an increase in both fertility and fecundity and a stabilization, if not a reduction, of mortality. "An increase of the reproductive power" writes Dr. Kuczynski "through an improvement in living conditions, especially through a more regular and more rational food consumption, is conceivable in two ways. It is possible that the child-bearing period be expanded or that the child-bearing capacity be intensified. Carr-Saunders emphasizes

<sup>1</sup> Census Report, Assam, 1931, p. 88.

<sup>2</sup> Population, Prof. Carr-Saunders, Chapter V, 1923; In his recent work discussing the African tribes, Prof. Carr-Saunders observes: "They show relatively low birth-rates, except where, as will be mentioned later, tribal organization has been disrupted, and death-rates which are not far below the birth-rates. The relatively low birth-rate is due to the maintenance of an ancient custom which keeps the family small — the custom of abstaining from intercourse until the child has been weaned, and weaning may be prolonged for a long time. The length of time differs from tribe to tribe, but the practice does effectively keep the successive children spaced out and makes large families of living children impossible. World Population; Past Growth and Present Trends, Oxford, 1936, p. 303.

<sup>3</sup> The Descent of Man, Charles Darwin, Vol. I, 1871, p. 132. also Cf. Prof. Carr-Saunders, op. cit.

the first possibility<sup>1</sup>—I am inclined to lay more stress on the second possibility<sup>2</sup>.

In what position are the primitive or the aboriginal tribes in India? Before the British occupation of India these tribes led a secluded life of their own in the trackless forests and hills of India. The rulers of the plains always left them alone and never subdued them completely. The British conquered and subdued them. The tribes came to be administered by an efficient and a thorough administration whose laws had sanctions behind them. Roads and railways were drawn across the hills and forests. The impact of the setting up of this administration and the accompanying western culture was very decisive in its effects. The Forest Department curtailed many of the forest privileges enjoyed formerly by these tribes. The Excise Laws prevented them from brewing mild liquors and thus drove them to an increased consumption of strong liquors. The Revenue Settlement put a stop to their *jhum* or shifting cultivation and only recognized their ownership in settled lands, so that some were still left the proprietors of their lands while others became landless labourers. Their exclusiveness was invaded by alien settlers. Their own languages began to be slowly supplanted by others and their tribal customs and beliefs were undermined. The process of Hinduisiation was accelerated and some

<sup>1</sup> The Population Problem; A Study in Human Evolution, Prof. Carr-Saunders, Oxford, 1922, p. 92.

<sup>2</sup> Population Movements, Dr. R. R. Kuczynski, Oxford, 1936, p. 36. Some others have offered a different explanation regarding this phenomenon. Dr. Crew, for instance, observed, that "there is a considerable evidence which points to the conclusion that in uncivilized races the breeding season is restricted and that male and female are reproductively active only during a limited part of the year. That civilized people do breed at all times during the year...is an indication of the results of altered social conditions...The extension of the sexual life of the individual is a direct result of the improvements in feeding and housing that are associated with civilization, and thus it is that civilized people are more fecund than those who live in a state of nature." (Proceedings of the World Population Conference, 1927, p. 219.). This explanation is, however, unsatisfactory in the light of later researches. The fact of there being breeding or rutting seasons in uncivilized races and the anthropoid apes, nearest to man in the process of evolution, has been contradicted by the actual observations of Dr. Zuckermann. "The characteristic differences of sexual behaviour in most mammals are affected very little by sexual conditions. They depend directly or indirectly on the constitutional difference. Dr. Zuckermann's studies have shown us that this is not true of man's nearest allies, the monkeys" (Dangerous Thoughts, Lancelot Hogben, 1939, p. 185, also Cf. Uniqueness of Man, Julian Huxley, 1941, p. 16). The proved absence of breeding seasons in tribal societies makes superfluous the question of their extension.

of the tribes came to be absorbed in Hinduism as the lower castes. Their tribal solidarity was broken up. Tribe as a unit disappeared and so did the village community. In former times the dowry to the bride's father was paid in kind and for that the bridegroom had to work for years, as grain rotted and cattle died. This automatically kept high the age of marriage. With the introduction of cash economy the dowry could be paid in a shorter period and this lowered the age at marriage. The introduction of clothes in some cases led to the spread of phthisis. On the other hand the British administration directly suppressed the tribal customs of infanticide, etc. and prevented warfare among them. It also considerably ameliorated their natural environment. The knowledge of medicine was diffused and infant mortality decreased. The opening of coal mines and the development of the tea plantations provided them with suitable employment. Thus the effects were not all good or all bad. They had all the merits of their demerits. As Dr. Hutton remarks, "Too often, perhaps, the rapid changes in their manner of life, and interference with tribal custom have led to apathy, indifference and deterioration and a decline in population. Too often perhaps our excise policies have fostered intemperance or the garments of prudery helped the spread of phthisis".<sup>1</sup> Thus the Aboriginal Tribes in India are in a process of transition. The former checks on population have become defunct and the preventive checks of a more civilized existence are not yet operative. Their "reproductive pattern", to use Dr. Pearl's phrase, presents the combined features of an increased fecundity and fertility and stabilized if not a lower mortality.

The problems of poverty and population are inter-related in all the regions. In some regions, like the Indo-Gangetic Plains, Eastern and Central, and the Central India Plateau, these problems are more acute while in some others, like Travancore, and East Bengal, they are less acute, though their existence in them can scarcely be denied. Poverty is universal in all the regions though some regions appear slightly better off than certain others. Indian poverty is a complex of many factors. The productive resources of the country are not being rationally used. There is an overwhelming preponderance of

<sup>1</sup> Dr. J. H. Hutton, "Primitive Tribes", in "Modern India and the West," Ed. J., S. S. O'Malley, Oxford, 1941. For the above discussion I have amply drawn upon this article. also Cf: Loss of Nerve, Verrier Elwin, 1941.

griculture. Excessive pressure on land has resulted in the existence of an enormous amount of poverty. Industrialization appears to be one of the chief ways of lightening this crushing burden. A large amount of increase in the national dividend is called for. It is not, however, only a problem of how the present overcrowding in agriculture could be remedied by people being diverted in sufficient numbers to industrial and other modern fields. It is also a question whether the standard of living can be raised by merely doing that. "The population problem in India is the problem of the remaking of a derelict people. Its solution depends upon a complete and a radical reconstruction of our entire national life, but the point which is important is that the reconstruction required by the needs of the situation cannot be carried out without making the control of population an integral part of the whole scheme of reconstruction"<sup>1</sup>. Thus production as well as reproduction must be rationalized. "A society must be biologically as well as economically a going concern" as Professor L. Hogben puts it.<sup>2</sup>

The limitation of numbers forms a more permanent and an important part in any scheme of national or regional reconstruction. Professor Goldscheid has observed: "A deep-seated connexion exists between the economics of production and those of reproduction. Production can only be rationalized if one undertakes to rationalize reproduction, just as intensively and intelligently. Economics consists of economics of merchandise and of people. It is not until we consciously develop economics with reference to human beings and when we learn to put capital that lies in humanity to an economic use that we shall obtain at the same time the optimum density for a definite period, and according to the culture in question, so that economics of reproduction will thus be the basis of economics generally".<sup>3</sup>

How is reproduction to be rationalized? It is now recognized that contraception is the only practical and effective means of consciously controlling reproduction. This element of "control" must

<sup>1</sup> India's Teeming Millions, Dr. Gyan Chand, 1939, p. xi. Cf. Out-line of Economic Theory, Prof. R. M. Joshi, 1932, p. 51.

<sup>2</sup> Retreat from Reason, Lancelot Hogben, Conway Memorial Lecture, May 20, 1936, p. 44.

<sup>3</sup> Proceedings of the World Population Conference, 1927, p. 105. It is interesting to recall here what Dr. Bonar has said regarding the essence of Malthus's teaching. Dr. Bonar writes: "There might even be a summary in one phrase; he desired economy in human lives. A man who secured that would be the greatest of economists." Economic Journal, June 1935.

be emphasised. Birth control or contraception is not so much a problem of technique as of a definite social psychology. For it is not the mechanical act of birth control but the mentality of prudence, foresight and above all of "conscious control" behind it, that matters<sup>1</sup>. Modern civilization, so far as it rests on applied science, is nothing but the extension of man's control over nature. Man has become a conscious agent changing nature to his need and controlling his own environment.

The way nature has reacted in certain regions, in the absence of conscious control by man, makes it the more necessary to emphasise it. In the absence of any control nature reacts in a disastrous way. It reduces fecundity and increases mortality, as has been noted in the case of some districts of the Indo-Gangetic Plain, West. The tale should not be repeated in the case of other regions. A wise policy of conscious control of reproduction is what is called for.<sup>2</sup> Its application will differ of course, according to the peculiarities of every region.

1 In this connexion the following remark should be noted: "In India, as elsewhere, even the minds of the supposedly educated classes are enveloped in the soul of an outworn morality which makes them incapable of change until it overwhelms them". Cedric Dover "Eugenio Legislation in India", the Quarterly Review, No. 523, January 1935.

2 "Evolution unfolds a new horizon of human destiny. Man has it in his power to become an active and intelligent directive agent in the evolutionary process, using his knowledge of the diversity of living creatures to decide which are essential to his own welfare as objects of use, or of aesthetic satisfaction, and using his knowledge of the properties of living matter to adjust the environment of the species he chooses as members of a rationally planned ecological system. The biological future of mankind is not limited to these two themes. We also have it in our power to set about creating new types of organisms—and perhaps ultimately of guiding the future evolution of unborn capacities of our own species." Professor Lancelot Hogben, Science for the Citizen, 1938, p. 971.

## APPÉNDIX I

### The Computation of 'correct death and birth rates' for an Indian region.

The correct or the true death-rate is the rate computed from the mean expectation of life at birth, which is derived from the life-table. The problem is how to derive the mean expectation of life at birth for the total population from the life-tables for males and females. Happily this difficulty has been solved by Dr. Kuczynski. He writes: "The procedure consists in multiplying the mean expectation of life for males by the proportion of male births and the mean expectation of life for females by the proportion of female births and adding the products. In England and Wales the mean expectation of life for males in 1936 was 60.131 years and that of females was 64.386 years. In the same year male births amounted to 310,605 and female births to 294,687. Of 10,000 newly born children 51,315 were boys and 48,685 were girls. The mean expectation of life at birth of the whole population is then  $(60.131 \times 0.51,315) + (64.386 \times 0.48,685) = 62.20$  years."

"It (the correct death-rate) eliminates the misleading effect of the actual age and sex composition of the population which is the result of changing fertility and mortality, and of emigration stretching over a past period of nearly hundred years. The death-rate derived from the life-table, which is also called the death-rate of the stationary population, is then a perfect gauge of current mortality."<sup>1</sup>

*Dr. Burgdorfer's method of computing the "true birth-rate":—* Compute (i) the number of women of child-bearing age the population would contain if it had the age and the sex composition of the life-table population and (ii) the annual number of children that number of women would bear at the current general fertility rate. Compute the proportion of that number of children per 1,000 of the total actual population and the result is the correct true birth-rate. The difference between the correct birth-rate and the correct death-rate gives the correct balance of births and deaths.<sup>2</sup>

<sup>1</sup> R. R. Kuczynski: "Analysis of Vital Statistics: Birth and Death Statistics": *Economica*, August 1938.

<sup>2</sup> Population: To-day's Question, McCleary, 1938, p. 97. See also Mr. David Glass, *Op. cit.*

In the following these methods of calculating "true birth- and death-rates" have been applied to Travancore, for the year 1931.

Total female population of Travancore in 1931—2,530,900.

Total population of Travancore in 1931—5,095,973.

True Birth-Rate for Travancore in 1931.

I. Number of women of childbearing age (15-45) according to the life-table = 576,790.<sup>1</sup>

II. Number of children that would be born to them according to the current fertility rate (which was 252 per 1,000 women (15-45) in 1931) = 145,351.<sup>2</sup>

III. True Birth-Rate = 28.52.

True Death-Rate for Travancore in 1931 :—

Expectation of life, at birth.	Number of births in 1930
Males 43.80	Males 56,461
Females 44.55	Females 53,538

The mean expectation of life at birth for the total population of Travancore in 1931 = 44.16.

True Death-Rate for Travancore = 22.64.

The balance of true birth and death rates in Travancore in 1931 :—

True Birth-Rate	28.52
True Death-Rate	22.64
True Balance	+5.88

<sup>1</sup> Census Report, Travancore, 1931, p. 125.

<sup>2</sup> Census Report, Travancore, 1931, p. 53.

## APPENDIX II

### The Logistic Curve applied to Some Regions.

In the following pages the results of the application of the logistic curve to the population data of eight regions have been set forth. Reference in general terms has already been made in Chapter I to Pearl's Logistic Law of Population. It is necessary here to go into certain details regarding the same. According to Dr. Pearl, human and animal populations are found statistically to follow in their growth a particular type of curve, the logistic.

" Mathematical investigation shows that a curve of this type is necessarily generated under certain simple postulates as to the interrelations between the two first order variables, birth-rates and death-rates, and the second order variable, density of population. One particular set of such postulates is that it shall be assumed, first, that birth-rates are markedly affected adversely by small increases in density at relatively low densities, while after a certain density is passed further increases produce only slight decreases in birth-rates down to an asymptotic limit; and, second, that death-rates are insignificantly affected by increasing density at relatively low densities, while after a certain density is passed death-rates markedly increase with increasing density up to an asymptotic limit."<sup>1</sup> Along with the above postulates the following must be also noted. " During each successive broad cultural epoch in the history of mankind the population within a given area grows according to the stretched out S shaped curve ( Logistic ). But when owing to discoveries and consequent changes of habit, a new cultural stage was entered upon, a new cycle of population growth was also begun, starting from a base line of the already attained population at the end of the epoch."<sup>2</sup>

All these limitations are inherent in the logistic curve. The results of its application in the following pages must be examined in that light. The logistic curves have been fitted in all to the population data of eight regions. Out of the eight, three, namely Travancore, Cochin, and Sind belong to *Group I*. Three of the remaining, East Coast Madras, North and South and Bombay Deccan belong to *Group II*. The other

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1 Proceedings of the World Population Conference, 1927, p. 38.

2 Biology of population Growth, Dr. Raymond Pearl, 1925, p. 19.

two, West Bengal and Indo-Gangetic Plain, West belong to *Group IV*.

The results, however, are of very little significance. As Dr. Fisher observed at the World Population Conference of 1927: "The logistic curve must either succeed in representing the actual course of population growth, including all secondary causes affecting such growth, or it fails in its general purpose."

The equation of the logistic curve as given by Yule ( Royal Statistical Society, Presidential Address, 1925 ) is

$$y = \frac{L}{1 + e^{\frac{\beta - t}{\alpha}}} \quad \left[ \text{Pearl's form : } y = \frac{L}{1 + \beta e^{-\alpha t}} \right]$$

$L$  is the upper limit ;  $\alpha$  the standard interval of the curve and  $\beta$  the time co-ordinate of the point of inflexion.

The methods of fitting the logistic are :

- (A) Pearl and Reed (Studies in Human Biology, 1924).
  - (i) Selecting three equidistant points.
  - (ii) Further approximation.
- (B) Yule's method ( p. 50-53, Journal of the Royal Statistical Society, 1925 ).

- (i) Three equidistant Co-ordinates—similar to A (i) above.
- (ii) The method of sums of reciprocals.

The logistic curves were fitted to regions by using one or the other method as was found suitable. The arbitrariness of the curve itself is responsible for this.

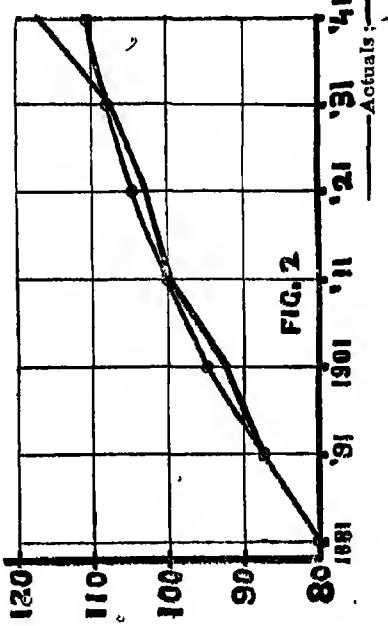
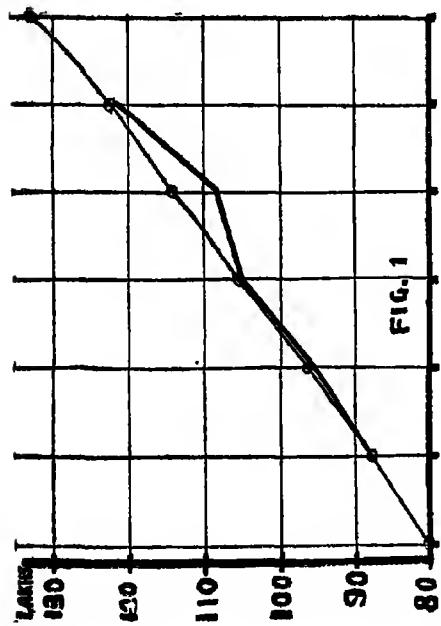
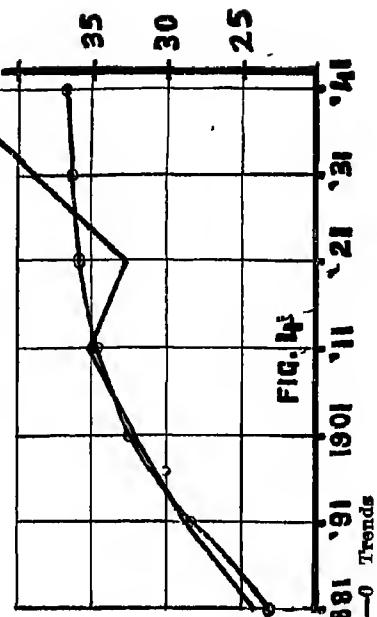
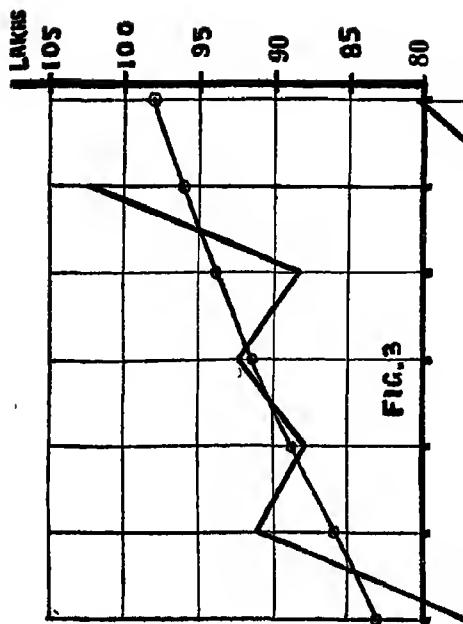
Method A (i) has been used in the case of Travancore ; A (ii) for Sind.

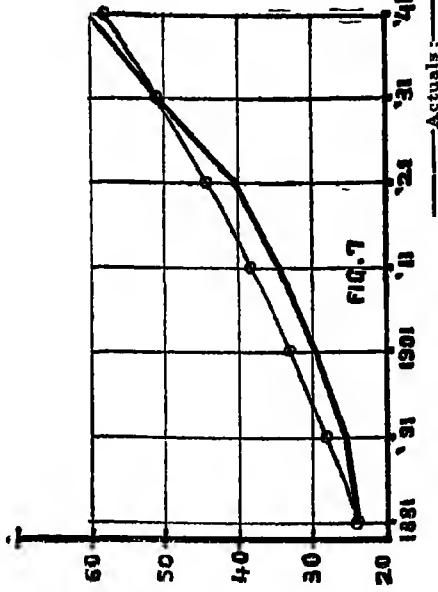
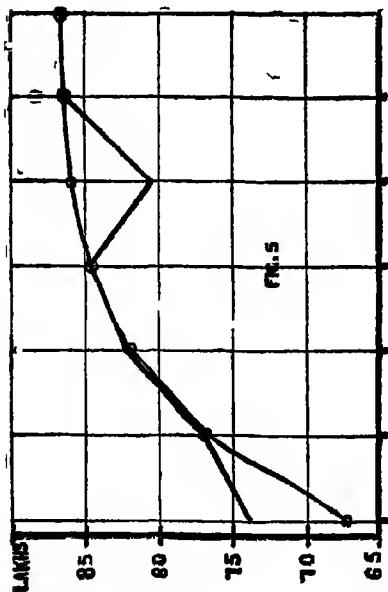
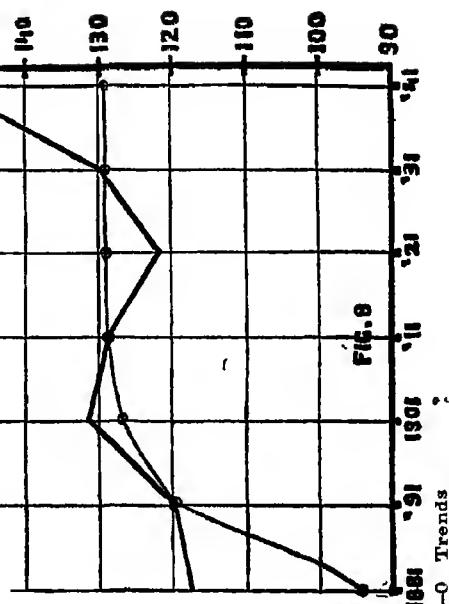
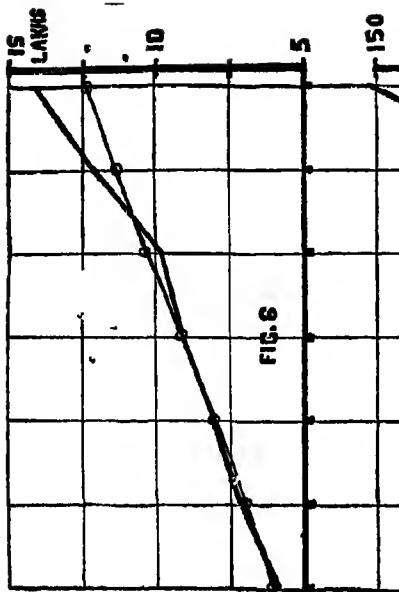
B (i) for Madras East Coast, North and South, West Bengal and Indo-Gangetic Plain, West. B (ii) for Bombay Deccan and Cochin.

TABLE SHOWING POPULATION &amp; POPULATION TRENDS FOR

	Fig. (1) Madras E. C. (North) in lakhs	Fig. (2) Madras E. C. (South) in lakhs		Fig. (3) Bombay Deccan in lakhs		Fig. (4) Sind in 10,000s		Fig. (5) West Bengal in lakhs		Fig. (6) Cochin in 10,000s		Fig. (7) Tavancore in 10,000s		Fig. (8) Indo-G. P. (West) in lakhs		
		Actual	Com- puted	Actual	Com- puted	Actual	Com- puted	Actual	Com- puted	Actual	Com- puted	Actual	Com- puted	Actual	Com- puted	
1881	... 7998	... 7944	77.23	82.95	241.7	230.65	73.94	67.44	60.03	61.04	240.12	240.10	11.75	9.40		
1891	87.94	87.94	87.45	87.45	90.99	86.04	287.5	285.46	76.89	76.89	72.29	70.80	255.78	282.20	11.95	11.95
1901	95.68	96.33	92.19	94.67	88.02	88.89	321.1	323.25	82.40	82.09	81.20	81.13	295.22	330.08	13.15	12.69
1911	105.10	105.10	99.92	99.92	92.43	91.50	351.3	345.74	84.68	84.68	91.81	91.90	342.90	383.94	12.87	12.87
1921	108.49	114.20	102.92	104.40	88.46	93.87	327.9	358.81	80.51	86.00	97.91	102.86	400.61	443.85	12.15	12.91
1931	121.76	121.76	107.81	107.81	102.42	96.02	388.7	364.33	86.47	86.47	120.50	113.73	509.60	509.61	12.96	12.92
1941	... 133.11	117.60	110.55	116.06	97.95	453.5	367.53	...	86.73	142.20	124.33	607.07	580.78	15.09	12.92	
Unit in years		20	20	10	10	10	10	20	20	10	10	10	10	20		
$\alpha$	289.91	118.01	111.97	370.68	86.94	200.04	1749.3								12.92	
$\beta$	3.7447	1.5205	6.7186	0.7101*	0.6297	4.5540	0.1899*								0.3318	
$\gamma$	3.1135	-1.5987	-7.0576	1.2350	-1.2812	3.7410	6.2852								-0.8251	

\* Pearl's form.





### APPENDIX III

#### A note on the "provisional" figures of the 1941 Census.

The "provisional" figures of the 1941 Census enumeration for some provinces were published after the manuscript was handed over to the press. It was possible to incorporate some of these figures into the body of the manuscript. But no comments on those figures could be put in. I attach here a few brief comments on these figures. With the limited material at hand these comments are necessarily brief, and according to the nature of the available figures, "provisional".

I start with noting a few general features of the decade (1931-41). In the opening years of the decade the world depression was at its worst. The slump in the agricultural prices was disastrous in its effect upon Indian agriculture. During this decade, however, the depression ran out its full course and during the latter half of it, a favourable trend towards partial recovery developed gradually. In 1936-37 the depression appeared to have lifted. In September 1939 came the declaration and the beginning of World War II. The war gave a fillip to industries essential for the war effort and stimulated business all round.

This was the general economic background. In India the decade was free from major calamities like famines or epidemics. Famines were not wide-spread or complete, but only partial and local in character. Public health was not affected by any major epidemic.

The 1941 Census enumeration was carried out from February 28th to March 2nd. This was a definite break with the past. At all the previous Censuses the enumeration was completed during a 24 hour period. This was increased to 72 hours at this Census and I am afraid with not very encouraging results. It is feared that this procedure will introduce some element of double-counting into the final figures.

The following are the percentages of growth recorded during 1931-41 in various regions.

Cochin.	...	18.0	Surma Valley.	...	15.0
Travancore.	...	19.1	Gujarat.	...	26.9
Sind.	...	16.7	Indo-Gangetic Plain, East	...	16.0
Brahmaputra Valley.	...	20.0	Indo-Gangetic Plain, Central.	14.0	
East Coast Madras, South.	...	10.0	Indo-Gangetic Plain, West.	16.0	
Bombay Deccan.	...	13.3	Konkan.	...	14.0
Central India Plateau	...	14.0			

Both in Cochin and Travancore the percentages of the growth of population during 1931-41 are in line with the percentages of growth recorded by both the regions during 1921-31. In both the actual growth recorded during 1931-41 has far exceeded the growth that was computed for the decade by the application of the logistic curve. A reference to Appendix II will make this clear. The rate and the magnitude of growth recorded in both the regions, however, are quite in keeping with the trends of fertility and mortality recorded in 1931 in both of them. These trends have, it seems, continued undisturbed during this decade also."

The percentage of growth recorded in Sind during 1931-41 is slightly smaller than that recorded during 1921-31. This decade witnessed the opening of the Sukkur Barrage. Extensive waste land was brought under cultivation. The settlement of waste land brought in its wake an influx of settlers on the new land from outside the province. A considerable part of the growth recorded during 1931-41 is probably attributable to this influx. The growth during this decade has occurred largely among females. The number of females per 1000 males in 1941 is 881 as compared with 782 in 1931. The ratio of females to males has not gone down but has actually increased, thus reversing the tendency of the decline of females, noted in the case of Sind from 1881. That the ratio has not dropped down from the 1931 level indicates that the influx of immigrants into Sind during 1931-41 has probably been of the permanent type.

The Brahmaputra Valley records a growth of 20 per cent. during 1931-41, a percentage slightly smaller than that of the pre-

vious decade. During the early years of this decade the tea industry was in the grip of the world depression. During the closing years, however, this gradually wore off and in 1941 when the Census was taken the general conditions of the industry could have been described as "normal". It is possible, therefore, that the outward movement shown by the plantation labourers in 1931 was absent in 1941. The other factor influencing growth in the Assam Valley is the influx of East Bengal Colonists into it. Its effects, however, cannot be assessed until more detailed figures come to hand.

In the East Coast Madras, South, a growth of 10 per cent. was recorded. This is more than double the percentage of growth recorded during the previous decade. The movement of population during 1931-41 is most remarkable in Trichinopoly, recording a growth of nearly 13 per cent. as compared with 0.52 per cent. of the previous decade. In all the districts of this region the growth of population is predominantly among the males. The number of females per 1000 males in 1941 was 1028 as compared with 1069 in 1931. The explanation of the extraordinary growth recorded during this decade and its predominantly male character is not far to seek. This decade witnessed the gradual narrowing down of the migration opportunities open to the population of this region in Burma, Ceylon, Malaya, etc. In the case of Ceylon, for example, from 1931-1939, with the single exception of the year 1934, the net balance of migration has been largely in favour of this region. The home-coming of the emigrants from this region to Ceylon, Malaya, etc., during this decade has swelled its population considerably at this Census. The large growth among the males is an eloquent testimony to the return in large numbers of male emigrants.

The Bombay Deccan records a growth of 13.3 per cent. during 1931-41, a percentage slightly lower than that of the previous decade. The growth is shared by all the districts of the region. West Khandesh leads with the highest increase of 18 per cent. Dharwar records the lowest percentage of growth, 9 per cent. In all the other districts the percentages of growth vary between 12 per cent. and 15 per cent.

The population in Surma Valley has increased by 15 per cent. during 1931-41. This is more than double the percentage of growth in the previous decade. The growth is largely among the males. The number of females per 1000 males in 1941 is 914 as compared with 928 in 1931. The conditions of the tea industry during this decade have already been noted while discussing the Brahmaputra

Valley. With that industry going normally in 1941, the region must have had a favourable balance of migration. The larger growth among the males indicates that during this decade the influx of migrants into this region has been considerable. A large part of the growth recorded in this decade might be attributed to the favourable balance of migration.

In Gujarat the population records a growth of 26.9 per cent. during 1931-41 as compared with 8 per cent. of the previous decade. The growth is *prima facie* suspect. The largest increase has been recorded in Ahmedabad (37.6 per cent.) and Surat (27.0 per cent.). A very large part of this increase is to be traced to the under-enumeration in this region at the 1931 Census.<sup>1</sup> It is remarkable in this connexion to note that in both the districts of Ahmedabad and Surat, where the largest increases during 1931-41 occur, there had been greater under enumeration at the last Census than in any other district of Gujarat. The percentage increase during 1921-31 was an underestimate. The 1931 base population being underestimated, the percentage of increase during 1931-41 becomes unduly inflated. The growth of population between 1921 and 1941 is real but the percentages of growth in each of the two respective decades are incorrect. On a very rough and tentative estimate, I should put the real increase during this decade in Gujarat round about 15 per cent.

The Konkan records a growth of 14 per cent. during 1931-41 as compared with 7.7 per cent. during 1921-31. In contrast with the decade immediately preceding but in conformity with all the other previous decades, the growth is largely confined to the metropolitan areas of Bombay City and the Bombay Suburban District. Bombay City records a growth of 28 per cent. and the Bombay Suburban District of 44.2 per cent. Kanara, Kolaba and Ratnagiri record increases of between 5.4 per cent. and 6.4 per cent. and Thana a growth of 10 per cent. The growth in Thana is largely due to its proximity to Bombay City. In 1941 Bombay City was doing "normal" business and the influx of labourers into the City was at its full strength.

Four regions in the United Provinces show large and extraordinary increases during 1931-41. The Indo-Gangetic Plains Eastern, Central and Western have increased by 16 per cent., 14 per cent. and 16 per cent. respectively. The population of the Central India Plateau increased by 14 per cent. during 1931-41. In all these

regions the percentages of growth during 1921-31 varied between 5.6 per cent. and 8.7 per cent. The increases shown by these regions are extraordinary, if not surprising. In the Indo-Gangetic Plain, East, the growth is largely among the females and the number of females per 1000 males in 1941 is 985 as compared with 967 in 1931. In this region the number of females had progressively decreased from 1901 to 1931 and the 1941 figure, therefore, indicates a reversion of that trend. Whether this is due to increased seasonal or temporary emigration from this region is an open question. It cannot be answered until more detailed data are available. In the remaining three regions the growth of population is shared by both the sexes. The ratios of females to males in all the three regions have slightly declined. Thus the progressive decline of females, marked from 1901 in all of them, is noticeable in this decade also. In all the four regions the growth of population during 1931-41 is unexpectedly large. Their age compositions at the last Census did not indicate the possibility of such growth. The economic development in these regions has not been of any extraordinary character during the last decade. The only explanation seems to be somewhat as follows. The absence of epidemics and large-scale famines from 1921 onwards in these regions have helped to wipe out the bad effects of mortalities from previous famines and epidemics on their age compositions. The age compositions have, therefore, become progressively favourable for an increasing growth of numbers.



